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Strengthening National Technological Self-Reliance Through ITS Innovation

**A New Dawn for ITS:
Building National Self-
Reliance from a Campus
of Innovation**

**Charting the Future of
Indonesia's Food
Security Through
Agricultural Machinery**

**The Spirit of Gelem Soro,
Herryan Syahputra's
Journey from ITS to the
Mining Industry**



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Strengthening National Technological Self- Reliance Through ITS Innovation

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About ITS

“With strengths in advanced engineering, digital transformation, maritime innovation, and sustainable development, ITS continues to advance technology for humanity”

Institut Teknologi Sepuluh Nopember (ITS) is a State University with Legal Entity Status (Perguruan Tinggi Negeri Badan Hukum or PTNBH) that contributes to the nation's self-reliance and serves as a leading reference in education, research, community service, and innovation development, particularly in support of industry and maritime advancement.

Historically, the existence of ITS is closely rooted in the spirit of Indonesia's struggle for independence. ITS was officially established in 1960, with the significant roles of several national figures, including dr Angka Nitisastro, Soedjasmono, and Kyai Haji Yahya Hasyim.

Carrying the motto ITS Advancing Humanity, ITS actualized a renewed spirit to create innovation through technology and knowledge for the benefit of society. In line with the aspirations of ITS, this motto serves as a motivation to actively contribute to the advancement of human civilization. Keep the spirit burning, students of the Campus of Heroes!

Vivat!
Hidup ITS, Hidup ITS, Hidup ITS!

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Greetings from Editorial Team

Hello, Civitas ITS!

Warm greetings from the Editorial Team of ITS Point XXII.

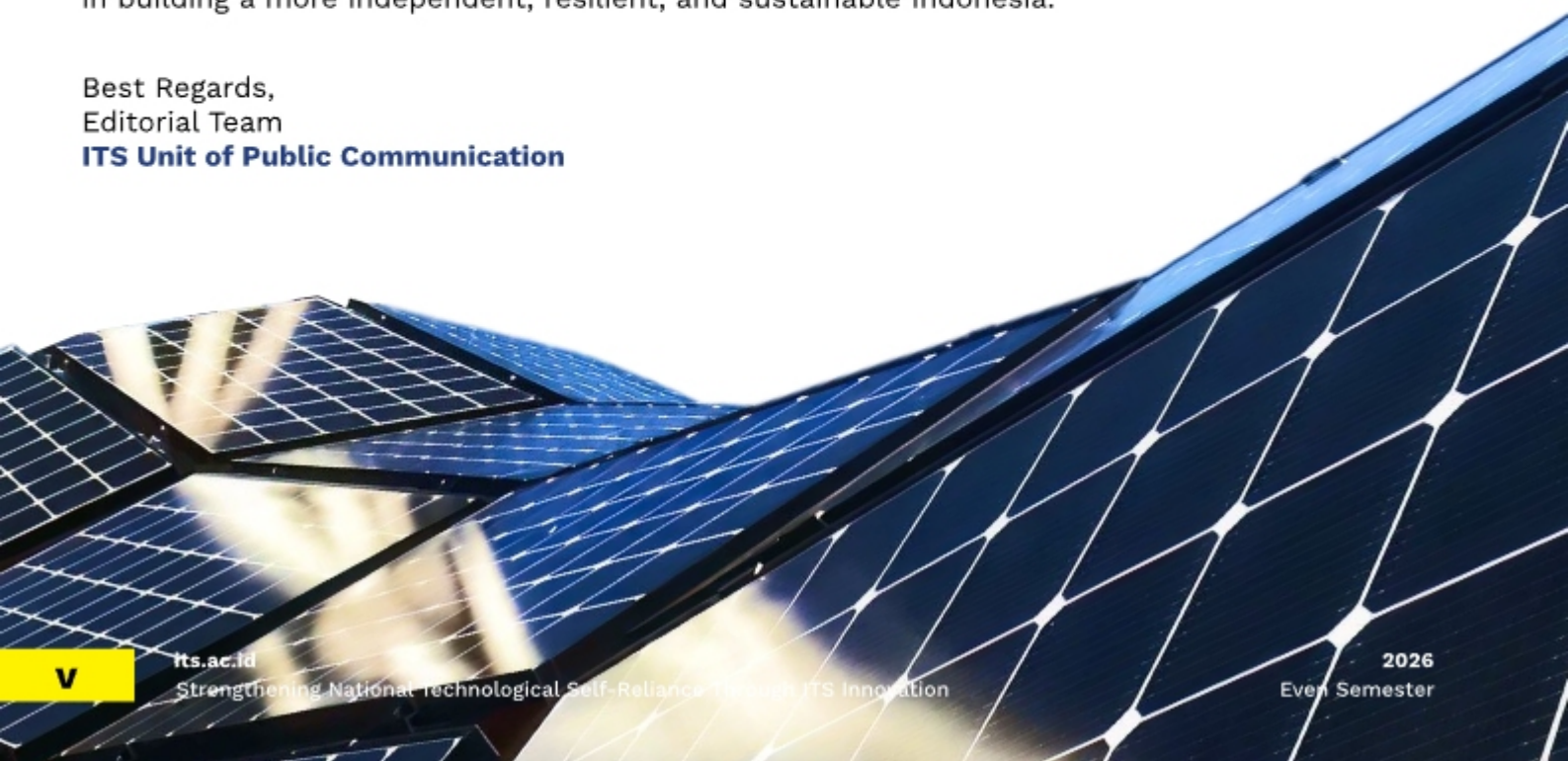
In this edition, ITS Point presents the theme “Strengthening National Technological Self-Reliance Through ITS Innovation” as a reflection of Institut Teknologi Sepuluh Nopember’s strategic commitment to advancing science, technology, and innovation for national development. As a leading technological university, ITS continues to strengthen its role in producing research-based solutions that carry academic significance and continue to be relevant to the needs of society, industry, and the nation.

Aligned with the direction of the ITS Strategic Plan 2026 – 2030 through the RAISE pillars, this edition highlights the contribution of ITS in supporting Indonesia’s technological independence. Research and innovation are positioned as strategic instruments that extend beyond academic output, serving to address national challenges, bolster industrial competitiveness, and support sustainable development.

Throughout this issue, readers will find various stories of ITS innovation in key sectors, particularly energy, food, and green industry. These sectors represent essential foundations for strengthening national resilience and responding to global challenges, including sustainability, climate change, resource efficiency, and inclusive economic growth. Each article is also connected to the Sustainable Development Goals (SDGs), reaffirming ITS’ commitment to maintaining alignment between technological progress and social, environmental, and economic responsibility.

Through ITS Point XXII, we aim to provide a comprehensive perspective on how ITS continues to contribute as a driving force for national technological independence. This edition is not only a record of institutional achievements, but also a publication that captures the spirit of collaboration, innovation, and contribution that defines ITS. We hope this edition offers valuable insights and inspires readers to recognize the importance of research and innovation in building a more independent, resilient, and sustainable Indonesia.

Best Regards,
Editorial Team
ITS Unit of Public Communication



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Greetings from Rector ITS

Prof Dr (HC) Ir Bambang Pramujati ST MScEng PhD

Assalamualaikum Wr. Wb.
May Peace Be Upon Us

Let us express our gratitude to Almighty God for the blessings of grace, health, and opportunity. By His grace, **Institut Teknologi Sepuluh Nopember (ITS)** is once again able to present ITS Point XXII as an institutional medium for documenting the university's progress, communicating its strategic direction, and strengthening the collective commitment of the ITS community to contribute to Indonesia and global society.

As a higher education institution, ITS assumes responsibilities that extend beyond educating competent graduates, advancing research, and generating innovation. Amid rapid global transformation, universities are increasingly expected to serve as centers of knowledge, sources of applicable solutions, and catalysts for social progress. Therefore, every academic and scientific endeavor undertaken by ITS must remain relevant and responsive to the evolving needs of society.

The theme of this edition, **“Strengthening National Technological Self-Reliance Through ITS Innovation”**, reaffirms ITS's strategic contribution to Indonesia's technological independence. Technological self-reliance is not merely the ability to independently develop products or systems. It also requires a sustainable ecosystem comprising knowledge, research, human resources, institutional capacity, and cross-sector collaboration.

As ITS enters the implementation period of its 2026 – 2030 Strategic Plan, the university continues to strengthen its transformation through the RAISE pillars. This framework guides ITS in improving educational quality, expanding the impact of research and innovation, strengthening institutional governance, and enhancing its national and international standing. Through this direction, academic excellence must be accompanied by tangible and measurable benefits for society.

Indonesia requires stronger technological capabilities in strategic sectors, particularly energy, food, and green industry. In the energy sector, ITS continues to develop solutions that improve efficiency, accelerate the energy transition, and promote responsible resource utilization. In the food sector, ITS possesses significant potential to develop technologies that strengthen national food security and sovereignty. ITS also supports industrial transformation toward production systems that are more efficient, adaptive, and environmentally responsible.

These initiatives reflect the institutional vision of **Advancing Humanity**. Every innovation produced by ITS must be grounded in human values, improve quality of life, expand access to knowledge and technology, and generate long-term benefits for current and future generations. Innovation should not remain limited to laboratories or academic publications but must be translated into applicable solutions for the concrete challenges faced by society.

Accordingly, the **Tri Dharma Perguruan Tinggi** must be implemented as a continuous commitment to generating broader societal impact. Education should develop academically competent, resilient, ethical, and responsible individuals. Research should produce relevant knowledge and innovative solutions, while community engagement should bridge academic expertise with measurable improvements in society. This commitment also supports the Sustainable Development Goals through initiatives that advance environmental sustainability, social welfare, economic development, and human well-being.

I firmly believe that ITS's greatest strength lies in collaboration. Lecturers, students, educational staff, alumni, industrial partners, government institutions, and communities form an interconnected ecosystem that supports the university's continued advancement. Through collective effort, sustained commitment, and the courage to innovate, ITS is well positioned to strengthen its contribution to national development.

Through ITS Point XXII, I hope readers will gain an understanding not only of the achievements of ITS, but also of the broader institutional direction we are collectively pursuing. Every achievement presented in this edition reflects dedication, perseverance, collaboration, and the shared conviction that knowledge must ultimately provide meaningful benefits to humanity.

Let us continue to move forward with the spirit of **ITS Tangguh**, **ITS Berdampak**, and **ITS Mendunia**. May ITS continue to grow as a leading technological university distinguished by excellence, adaptability, and integrity, while contributing consistently to national progress and global civilization.

We believe in the value of knowledge, the power of teaching and research, and the ways that what we do here can benefit society.

Vivat!
Hidup ITS, Hidup ITS, Hidup ITS!

Wassalamualaikum Wr. Wb.

Warm regards,
Rector of ITS
Prof Dr (HC) Ir Bambang Pramujati ST MScEng PhD

A New Dawn for ITS: Building National Self- Reliance from a Campus of Innovation

This Article Supports SDG 4 and SDG 17
Quality Education; Partnerships for the Goals



Amid the rushing currents of technological disruption, the mastery of knowledge and innovation has become a decisive factor in achieving national self-reliance. As a technology-based university, Institut Teknologi Sepuluh Nopember (ITS) strives to deliver innovations that contribute meaningfully to the nation.

To bring this vision to life, the Campus of Heroes has drawn up its Strategic Plan (Rencana Strategis or Renstra) 2026 – 2030 as a guide for institutional development over the next five years. Guided by this ambitious roadmap, ITS has charted a course of transformation toward becoming a Global Impact University. ITS envisions itself as a campus capable of delivering broad benefits to society, industry, and the nation's development.

RAISE: The Institution's Compass for Innovation

The Rector of ITS, Prof Dr (HC) Ir Bambang Pramujati ST MScEng PhD, conveyed that ITS has charted its course under a single, integrated framework. The strategic framework, titled Relevance, Academic Excellence, Innovation, Sustainability, and Efficiency (RAISE), has been adopted as ITS's compass for strengthening research and accelerating technology downstreaming, both of which are essential to advancing national technological self-reliance.

Bambang explained that the implementation of RAISE is focused on strategic sectors such as food security, energy self-reliance, and maritime technology. According to him, such alignment with the development direction would produce a greater impact while reinforcing ITS's commitment to high-quality research. "To be well received by the market, researchers must make societal benefit the starting point of their work," he added.

Therefore, ITS encourages researchers to engage a wide range of stakeholders, such as industry, government, communities, and the public, from the earliest stages of problem identification onward. In practice, ITS is strengthening its downstreaming ecosystem via the Science Techno Park (STP), centers of excellence in science and technology, and integrated business incubators. "In this way, downstreaming becomes easier because the resulting innovations are aligned with the users' needs from the very start," he said.

Strategic Theme	Strategic Target	Strategic Goal
(R) Relevant and Impactful Research	The implementation of research and innovation that delivers tangible impact by creating relevant and applicable technological solutions for society and industry.	Impactful
(A) Academic Excellence and Global Reputation	The realization of an academic environment that is excellent and industry-relevant to support student character and competency development, thereby producing high-competency, global-standard graduates with an entrepreneurial spirit, superior achievements, and soft skills relevant to workforce demands.	Global
(I) Innovation and Entrepreneurship	The realization of strategic, high-quality collaboration with industry , while simultaneously enhancing employment opportunities for students and alumni through innovation and entrepreneurship.	Impactful
(S) Sustainable Development	The availability of reliable, efficient, and integrated physical and information and communication technology (ICT) infrastructure to support sustainable development.	Resilient
(E) Excellence Governance	The realization of professional, high-quality management of finance, infrastructure, and human resources (HR) as the foundation for excellent governance.	Resilient

Research Grounded in a Human-Centered Approach

In keeping with that principle, ITS places the human-centered approach at the heart of its research and innovation. Bambang believes that technological advancements must always be accompanied by an understanding of human needs to produce solutions that truly address real-world challenges. "Great technology loses its meaning if it fails to understand the needs of society," said the Professor of the ITS Mechanical Engineering Department.

To bring this approach to life, Bambang encourages stronger cross-disciplinary collaboration to enrich the perspectives of ITS researchers across various fields. In doing so, ITS researchers develop technical expertise alongside a greater sensitivity to the social challenges faced by communities. Through such collaboration, ITS hopes to produce innovations that are more relevant and far-reaching in impact.

The spirit of human-centered technology is already reflected in various ITS innovations, including Kakarobot. Created by ITS students, this educational robot is designed to broaden access to robotics learning for children in underdeveloped, frontier, and outermost (Tertinggal, Terdepan, and Terluar or 3T) regions. "This innovation also serves as an instrument for advancing equitable access to education," he concluded.

"From the campus of innovation, ITS ushers in a new dawn of national self-reliance through relevant, collaborative, and human-centered research."



Strengthening a Global Reputation

Beyond focusing on contributions to society and meeting national needs, ITS continues to strengthen its international research networks. Bambang explained that this step aims to keep pace with the latest research developments while expanding collaboration with various global partners. In his view, internationalization is a means of reinforcing institutional capacity so that the benefits can ultimately return to the nation.

Bambang affirmed that ITS's efforts to expand international cooperation are realized through a range of programs, from global internships and joint research to international consortia. According to him, such cooperation serves as a means of acquiring new technologies while promoting knowledge transfer and strengthening human resource capacity. "Through these collaborations, ITS can enhance its competitiveness and contribution to the nation," he said.

This commitment aligns with the Sustainable Development Goals (SDGs), particularly Goal 4 on Quality Education and Goal 17 on Partnerships for the Goals. Building on its expanding global network, ITS seeks to improve the quality of education while reinforcing its research and innovation capacity. These efforts are expected to help achieve national technological self-reliance.



Eventually, the ITS Strategic Plan 2026 – 2030 stands as the institution's commitment to delivering research and innovation that are academically excellent yet relevant to the needs of society and the nation. Under the RAISE strategic framework, ITS is strengthening its institutional capacity to address multifaceted global challenges. Guided by this principle, every collaboration, innovation, and technological advance is intended to serve the interests of the nation. **(syifa/feb)**



ITS's Strategy for Cultivating Human Resources Toward Global Reputation

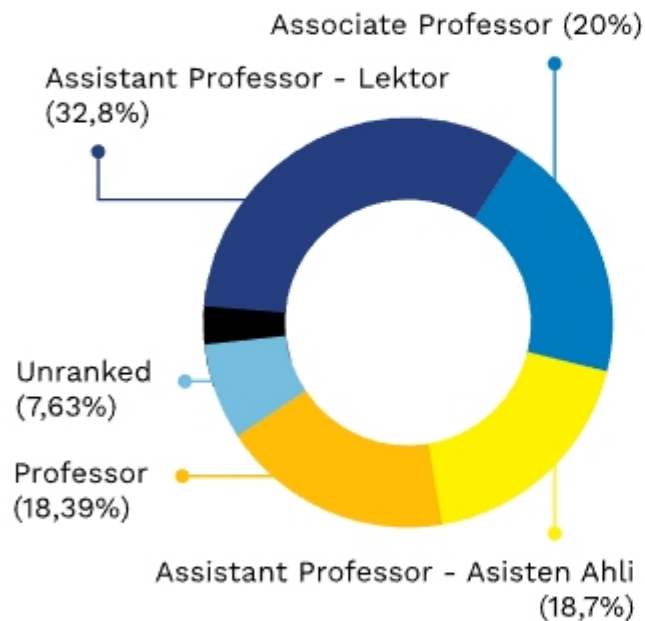
This Article Supports SDG 4 and SDG 9
Quality Education; Industry, Innovation, and Infrastructure



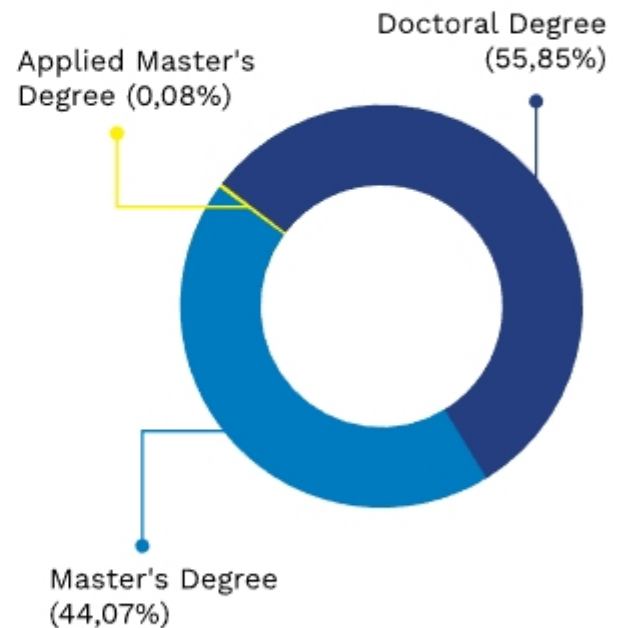
Building a sustainable global reputation depends not merely on academic and research achievements, but equally on the quality of the human resources that drive them. Recognizing this, Institut Teknologi Sepuluh Nopember (ITS) continues to design a range of strategic programs aimed at cultivating outstanding human capital capable of addressing future challenges.

Vice-Rector III for Human Resources, Organization, and Technology & Information Systems at ITS, Imam Baihaqi ST MSc PhD, explained that this perspective forms one of the foundational pillars of the ITS 2026 – 2030 Strategic Plan (Rencana Strategis or Renstra). The plan itself is built upon the pillars of Relevance, Academic Excellence, Innovation, Sustainability, and Efficiency (RAISE). Through this strategy, ITS seeks to strengthen professional and high-quality human resource governance.

Functional Position



Educational Qualification



Accelerating Global Competitiveness

As an institution of higher learning, the quality of human resources stands as one of the principal determinants of ITS's success in enhancing its reputation on the global stage. In the academic sphere, lecturers serve as the spearhead in producing high-quality education and research. Accordingly, career development for lecturers at ITS is designed systematically and purposefully, in accordance with prevailing national regulations.

From the outset of their appointment, lecturers follow a clearly defined and tiered career trajectory, progressing from assistant professor and associate professor to senior associate professor and, ultimately, full professor. Each stage demands the continuous enhancement of competencies across education, research, and community service. "Through this scheme, lecturers are given the space to learn and develop progressively, allowing their full potential to be optimized at every stage of their career," said Imam.

The Lancaster University alumnus added that ITS provides a variety of competency-development programs to support this process, ranging from training aimed at improving teaching quality to facilitation of professional certification at both the national and international levels. Through these measures, lecturers are equipped not only to excel in academic activities but also to adapt to the evolving landscape of scientific knowledge and shifting industry demands.

Outstanding Human Resources, Global Reputation

At present, approximately 45 percent of ITS lecturers hold master's degrees. Imam noted that through various mentoring schemes, scholarships, and career-development programs, ITS is working to accelerate lecturers' pursuit of advanced degrees. "They are therefore continually encouraged to pursue doctoral studies, so as to strengthen the institution's academic and research capacity," said the lecturer from the ITS Department of Business Management.



This commitment is further reinforced by the Kampus Ibu yang Luhur dedication to cultivating a supportive research ecosystem through the ITS Directorate of Human Resources and Organization (Direktorat Sumber Daya Manusia dan Organisasi or DSDMO). This is carried out through research mentoring initiatives and the organization of an internal campus competition known as ITSprovement, through which the creative and innovative ideas of ITS researchers can be channeled and further developed.

By strengthening the quality of its human resources, ITS remains optimistic about its capacity to enhance both its reputation and its competitiveness on the global stage. Furthermore, ITS is committed to building a robust research ecosystem within the campus to generate innovations capable of addressing future challenges. "These various strategies are expected to give rise to a greater volume of high-quality, innovative research that delivers meaningful impact for society," he added.

Room to Grow, Research that Matters

Once the quality of human resources has been strengthened, the next step is to ensure that this competency translates into relevant, high-impact research. This aligns with the spirit of RAISE, which emphasizes that research must not only yield scientific publications but also generate tangible contributions. One indicator of particular focus in this regard is the h-index, a metric used to measure the scientific productivity and impact of an institution or researcher.

Head of the Treasury and Reporting Subdivision at the ITS Directorate of Research and Community Service (Direktorat Riset dan Pengabdian kepada Masyarakat or DRPM), Indri Meilani SIKom MMT, emphasized that the h-index reflects not merely the volume of publications but must also correspond to their quality. As such, ITS continues to drive improvements in its h-index by fostering a robust, quality-oriented research culture. "As the quality of research improves, citations and the

h-index will naturally follow," she added.

To achieve this, Campus of Heroes has formulated and implemented a number of strategies, one of which involves strengthening international collaboration. According to Indri, such partnerships open opportunities for ITS researchers to gain insight into global issues while expanding their research networks with partners abroad. Beyond increasing opportunities for publication in highly reputable journals, these collaborations also serve to bolster the visibility and impact of ITS research on the international stage.

In addition, the research focus of ITS scholars is also directed toward pressing national issues, including the energy, food, and green-industry sectors, regarded as strategic areas in supporting Indonesia's self-reliance. In this way, research generates not only scientific impact but also far-reaching social benefit. "Another strategy pursued by ITS involves the development of multidisciplinary research, both within the campus and in collaboration with external partners," Indri concluded.

Through these efforts, Imam and Indri alike hope that ITS can contribute meaningfully to the advancement of science and knowledge. This endeavor also reflects ITS's role in supporting global priorities through the achievement of the Sustainable Development Goals (SDGs) specifically Goal 4 on Quality Education, Goal 9 on Industry, Innovation, and Infrastructure, and Goal 17 on Partnerships for the Goals. **(har/ash/fal)**



ITS Study Centers Join Forces to Build the Nation's Technological Foundation

This Article Supports SDG 7 and SDG 9
Affordable and Clean Energy; Industry, Innovation, and Infrastructure



Amid steadily rising energy demand, Institut Teknologi Sepuluh Nopember (ITS) is strengthening its role through research and technological innovation that delivers tangible benefits to society. Through the Directorate of Research and Community Service (Direktorat Riset dan Pengabdian kepada Masyarakat or DRPM), a wide range of research and technology development initiatives are being advanced on a sustained basis. These efforts are directed at supporting national energy security while reinforcing Indonesia's technological self-reliance.



ITS Research Development Atmosphere

The Head of DRPM ITS, Fadlilatul Taufany ST PhD, explained that universities hold a strategic role in addressing energy challenges by developing technologies that respond to the nation's needs. According to him, energy security rests not only on the availability of resources but also on a nation's capacity to harness the potential it already possesses. "Energy security must be underpinned by technology rooted in local potential," he remarked.

In line with this, DRPM ITS continues to encourage the formation of a collaborative research ecosystem across the Campus of Heroes through the growth of various strategic study centers. These centers focus on sectors spanning energy, mineral resources, advanced materials, nanotechnology, and appropriate technology. Their presence represents ITS's effort to bridge the needs of industry and society with the advancement of science and sustainable technological innovation.

Beyond that, ITS also seeks to ensure that its research does not stop at publication but progresses toward downstreaming and real-world implementation. To achieve this, ITS forges strong synergy among researchers, industry, government, and the public. "With collaboration, innovation can deliver a far broader impact," he added.



Head of DRPM ITS
Fadlilatul Taufany ST PhD

Answering the National Energy Challenge

One strategic study center dedicated to strengthening national energy security is the Center for Advanced Materials and Nano Technology Studies. In response to growing energy needs, this research center has become a cornerstone of energy technology development at DRPM ITS. It has given rise to numerous innovations, ranging from renewable energy and electric vehicles to the utilization of local resources.

The Head of the Center for Advanced Materials and Nano Technology Studies, Prof Dr Agung Purniawan ST MEng, explained that the development of energy technology is inseparable from a nation's mastery of materials science. From his perspective, innovations such as energy-conversion technologies and alternative fuels require the support of materials that are more efficient and higher-performing. "Advanced materials and nanotechnology play a vital role in the energy sector," he asserted.

That role is evident in the breadth of research being pursued at ITS, from improving the efficiency of solar cells to developing hydrogen catalysts and fuel cells. ITS is also developing batteries for electric vehicles as well as catalysts for converting palm oil into fuel.

This work shows that energy innovation rests not only on the energy source itself, but also on the materials technology operating behind it

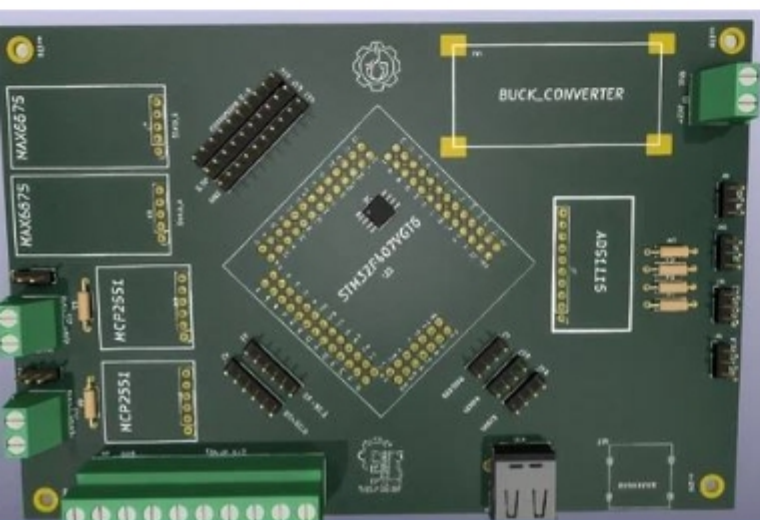
– Agung

Rather than focusing solely on present-day energy needs, the center—led by a Professor of the ITS Department of Materials and Metallurgical Engineering—is also developing technologies for the future.

He noted that one of his plans is to upgrade cleanroom facilities to support research into the fabrication of semiconductors at the micro- and nanoscale. This step forms part of ITS's effort to prepare human resources attuned to the trajectory of global technology.

According to the Tulungagung-born academic, fostering advanced materials research must proceed hand in hand with collaboration among universities, industry, and government. Such cooperation is essential so that research findings do not stall in the laboratory but can progress toward testing, implementation, and eventually tangible benefits for society and industry. "Connectivity between universities and industry must be built in earnest," he stated.

Furthermore, the lecturer, whose expertise lies in Biomaterials and Surface Engineering, said that technological self-reliance cannot be achieved overnight. It demands a grand strategy, regulatory support, and the courage to keep advancing strategic frontier research. "Sovereignty in research and technology must be realized together," Agung affirmed.





Technology in Service of Others

The same spirit of advancing national self-reliance also runs through the Center for Appropriate Technology Studies. Led by Hendro Nurhadi Dipl Ing PhD, this research center focuses on developing innovations closely attuned to the needs of Indonesian society. True to its mission, the unit believes that the value of an innovation lies in its capacity to provide practical and meaningful solutions.

Through the Center for Appropriate Technology Studies, ITS translates community needs into practical innovations by responding to evolving conditions on the ground. At present, there remains a strong need for innovations in mechatronics, automation, and eco-friendly energy. "These innovations must be capable of being produced independently," said the lecturer from the ITS Department of Industrial Mechanical Engineering.

A concrete expression of this approach is reflected in ITS's collaboration with the Indonesian Ministry of Agriculture in the national agricultural sector. Hendro explained that the partnership grew out of the challenge of peatland in Kalimantan and Papua that is difficult to cultivate. The soft, waterlogged nature of peatland makes conventional tractors hard to use, as they easily sink during operation.

Based on that challenge, ITS developed an adaptive tractor called Traktor Boat. Hendro explained that this electric-powered plough is designed to float on the surface of peatland, making it easier to operate. The innovation simultaneously opens access to more adaptable agricultural technology across Indonesia's diverse landscapes.



Another contribution of the Center for Appropriate Technology Studies is Supersun, an innovative modular solar power generator developed in collaboration with Pertamina. The device is designed specifically for coastal and remote island communities located far from the main electricity grid. "There are many other innovations as well, such as a drinking fountain and a clove-climbing harness," Hendro noted.

The researcher, who hails from Blora, Central Java, noted that the approach adapted by the Center for Appropriate Technology Studies is beginning to demonstrate tangible impact. A number of the research center's innovations have been commercialized and even independently replicated by communities. "This shows that innovation does not stop at the development stage but has become part of people's everyday lives," Hendro said with pride.

ITS Innovation for the Nation

ITS believes that good innovation is determined not by technological advancement alone, but also by the extent to which it directly benefits society. For that reason, the Kampus Ibu yang Luhur remains committed to delivering adaptive, high-impact innovations for the future. This step further reinforces ITS's role as an institution that contributes to national and global progress.

The array of innovations, research, and technology developed by ITS has demonstrated its role in answering national challenges while meeting the needs of society. This contribution also reflects ITS's commitment to supporting the realization of a better, more sustainable way of life. These efforts align with the Sustainable Development Goals (SDGs), particularly Goal 7 on Affordable and Clean Energy and Goal 9 on Industry, Innovation, and Infrastructure. **(awa/dif/fal)**



The New STP ITS Drives Research Downstreaming as an Orchestrator of the National Economy

This Article Supports SDG 17
Partnerships for the Goals



Amid the swift currents of technological advancement, Institut Teknologi Sepuluh Nopember (ITS) continues to strengthen its role in driving the downstreaming of science-based research and innovation. Through the development of Science Techno Park (STP), ITS is building an integrated ecosystem to serve as a primary engine of knowledge-based economic self-reliance in Indonesia.



Director General of Research and Development of the Indonesian Ministry of Higher Education, Science, and Technology Republic of Indonesia, Dr Mohammad Fauzan Adziman ST MEng ready to support and facilitate STP ITS researchers in further refining their innovations

Toward the Commercialization of ITS Research

STP ITS is designed as an area that integrates a range of parties in the development of innovation—from academics and industry to government and the public. Building on the transition from the triple helix to the quadruple helix, the STP becomes a collaborative platform that connects societal needs with the university's research outcomes.

As explained by the Manager of STP ITS, Prof Dr Ir Bambang Sudarmanta ST MT IPM AEng, the STP now operates under the name New STP ITS, reflecting strengthened institutional systems and governance. Under the auspices of the ITS Directorate of Innovation and Science Techno Park (Direktorat Inovasi dan Kawasan Sains Teknologi or DIKST), the STP is reinforcing its organizational governance, infrastructure, and facilities to support research and innovation. "All of the efforts are aimed to accelerate the process of downstreaming and commercializing research at ITS," Bambang said.

As an orchestrator of the economy, the New STP ITS plays the role of connecting societal needs with the research outcomes of the university. These outcomes are then further developed in collaboration with industry and government to deliver tangible solutions. This role strongly supports the national downstreaming agenda across strategic sectors such as food, health, energy, defense, maritime affairs, digitalization, and AI- and semiconductor-based technologies.

According to Bambang, the STP addresses a longstanding challenge in academia: closing the gap between research outcomes and industrial application. Many university innovations hold significant potential, but struggle to be scaled up for wider implementation. It is in this context that STP ITS functions as a bridge for downstreaming.

Clusters for Developing Innovation

To support the research and innovation process, STP ITS provides a range of facilities that can be used by the academic community and industry partners alike. Its development is delivered through four main clusters: Automotive, Maritime, Creative Industry, and Information and Communication Technology (ICT)/Robotics. The lecturer from the ITS Department of Mechanical Engineering explained, "All four are equipped with facilities such as laboratories, development workshops, and testing areas."

One example of the enhanced facilities at the New STP ITS is evident in the Automotive Cluster. STP ITS is the only STP in Indonesia with a circuit facility to support automotive-related research. This enables a more comprehensive development of vehicle technologies, from the design and development to performance testing.

Building on enhanced facilities, Bambang added, STP ITS is also expanding opportunities for collaboration in technology development. Beyond the academic community, STP ITS serves as a collaborative platform with external partners, such as industry, across various research initiatives. "Our hope is that more ITS innovations can be developed at a larger scale," said the former Head of the ITS Department of Mechanical Engineering (2019).

Research with strong downstreaming potential also receives targeted mentoring through an incubation scheme. To support commercialization, STP ITS is backed by a Technology Transfer Office (TTO) that manages intellectual property such as patents and copyrights. Complementing these efforts is the Innovative Business Incubator and Services (Inkubator dan Layanan Bisnis Inovatif or ILBI), which nurtures technology-based startups.





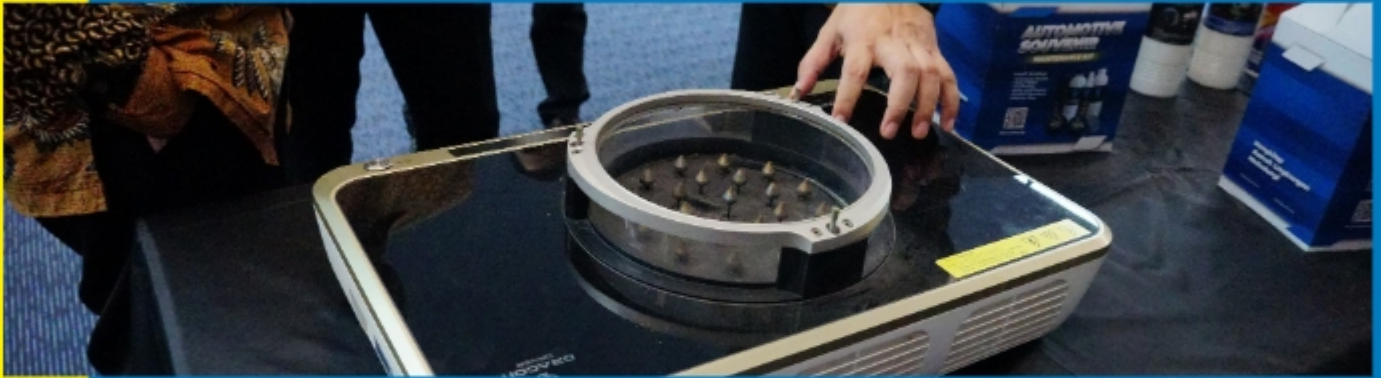
Furthermore, the development of the STP is supported by the Higher Education for Technology and Innovation (HETI) program, funded by the Asian Development Bank (ADB). This demonstrates that STP ITS can serve as a driver for the downstreaming of research outcomes that will, in turn, lift the national economy. "Technological and economic self-reliance can only be achieved through collaboration," said Bambang.

The Tangible Contributions of STP ITS

Supported by STP ITS's facilities and collaborations with its strategic partners, a range of innovations has made tangible contributions to society. Bambang cited the GESITS electric vehicle as an example, which has been mass-produced and is used by the general public. "There is also BangkiITS, an electric motorcycle widely used in regions with rugged terrain such as Papua," said the professor, who earned all of his academic degrees at ITS.

Beyond technology, STP ITS also contributes to human resource development through various training programs. One of them is skills training for conventional automotive technicians to convert fossil-fuel-powered engines into electric-powered systems. This is deemed important to support economic resilience in the face of rapid technological advancement.





Even so, innovation development continues to face challenges, particularly the lengthy time required to bring innovations to fruition and the substantial funding needed. For that reason, STP ITS continues to strengthen its network of national and international partners to accelerate the downstreaming process. "We hope that more ITS research will secure funding and come to fruition," said Bambang.

Going forward, STP ITS will continue to strengthen its role by enhancing governance, expanding its facilities, and fostering broader collaboration to deliver greater benefits to society and industry. As part of the nation's top-tier STPs that are members of the Konvensi Sains dan Teknologi Industri Indonesia (KSTI), STP ITS supports Sustainable Development Goal 17 on Partnerships for the Goals.

In line with this, the Madiun-born academic also envisions STP ITS as a prominent hub for public education. He urged that all elements of Indonesian society must work hand in hand to realize technological and economic self-reliance. **(mol/cal)**

An impactful technology is one whose benefits we can experience ourselves as Indonesians

– Bambang



Chandra Alfarizqy

The Batch 2024 Student of the ITS Department
of Visual Communication Design

INNOVATING NATIONAL INDEPENDENCE

MINING ENGINEERING





Strengthening ITS's Global Competitiveness Through Research and Innovation

This Article Supports SDG 7 and SDG 9
Affordable and clean energy; Industry, Innovation and Infrastructure

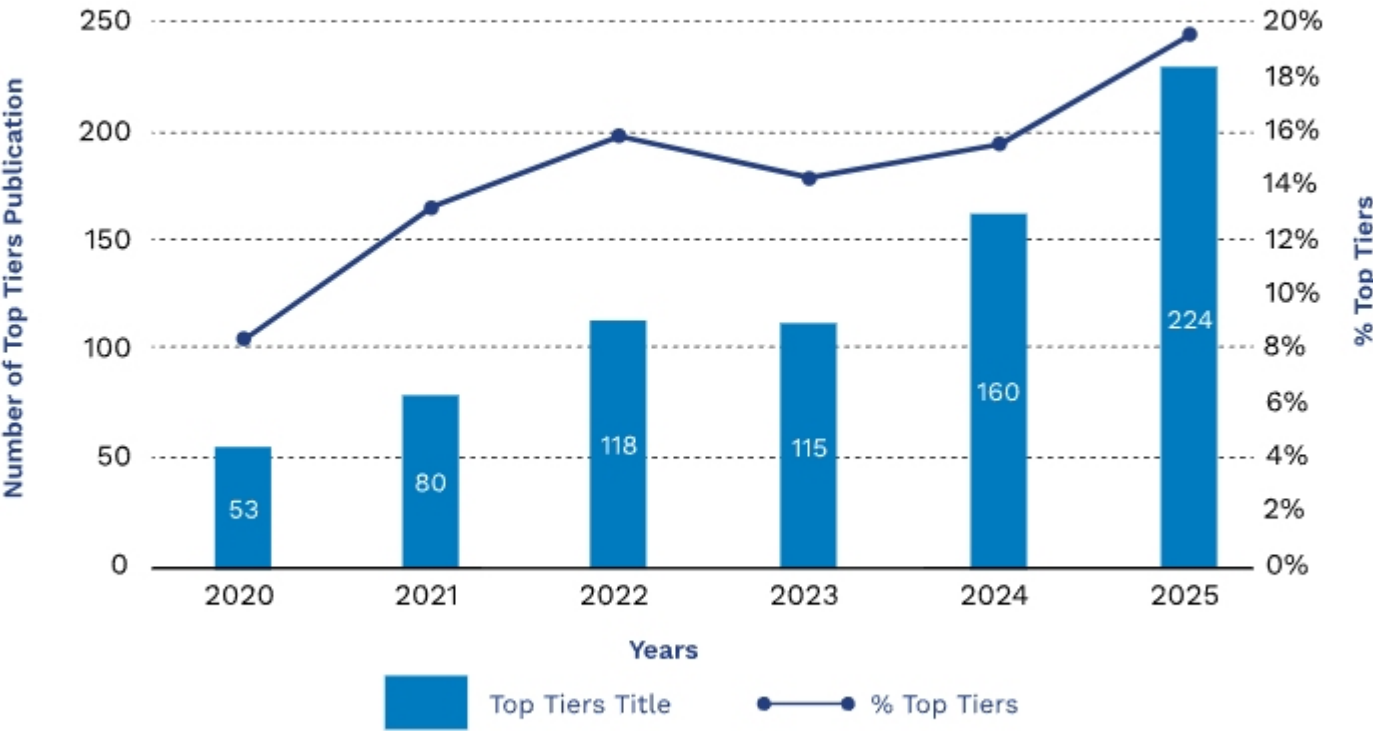
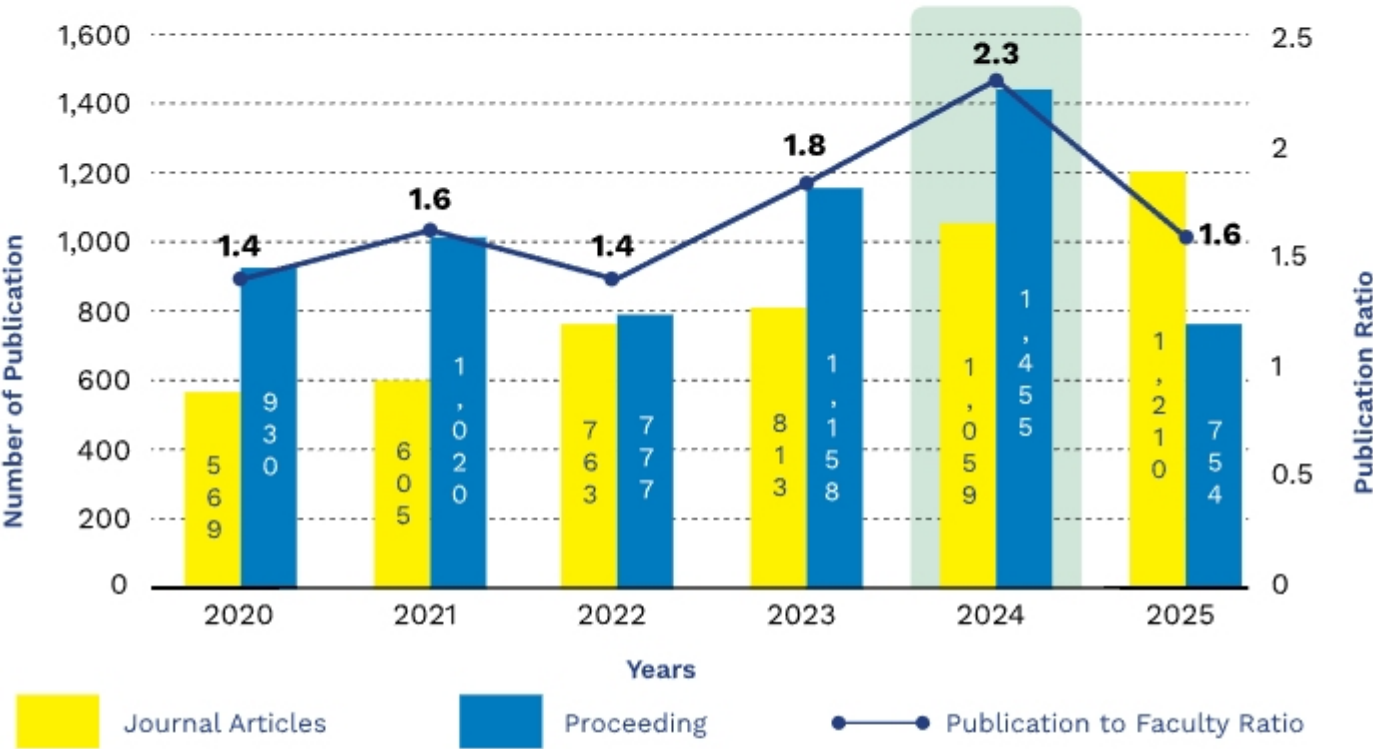


Institut Teknologi Sepuluh Nopember's (ITS) efforts to attain world-class university status are not limited to improving the quality of education and expanding international collaboration. Beyond these endeavors, ITS has cultivated a growing culture of research and innovation within its academic environment. This culture encourages the ITS academic community to produce research and technologies that are relevant to current needs while remaining oriented toward the future.

This commitment is currently reflected in the increasing number of research outputs and innovations emerging from the Campus of Heroes each year. The steady growth of research achievements indicates that the research ecosystem at ITS is developing in a positive direction. Beyond producing publications and academic outputs, these research initiatives are also translated into applied technologies capable of delivering tangible impact for society, industry, and the advancement of knowledge.

Strengthening Research Ownership

While these milestones reflect strategic success, institutional data as of December 2025 identifies a clear path for further growth. Currently, 157 faculty members—86% of whom hold Master's degrees—have yet to establish an h-index. Targeting this cohort for doctoral advancement and research mentorship represents a key strategic opportunity to amplify ITS's global scholarly footprint further.

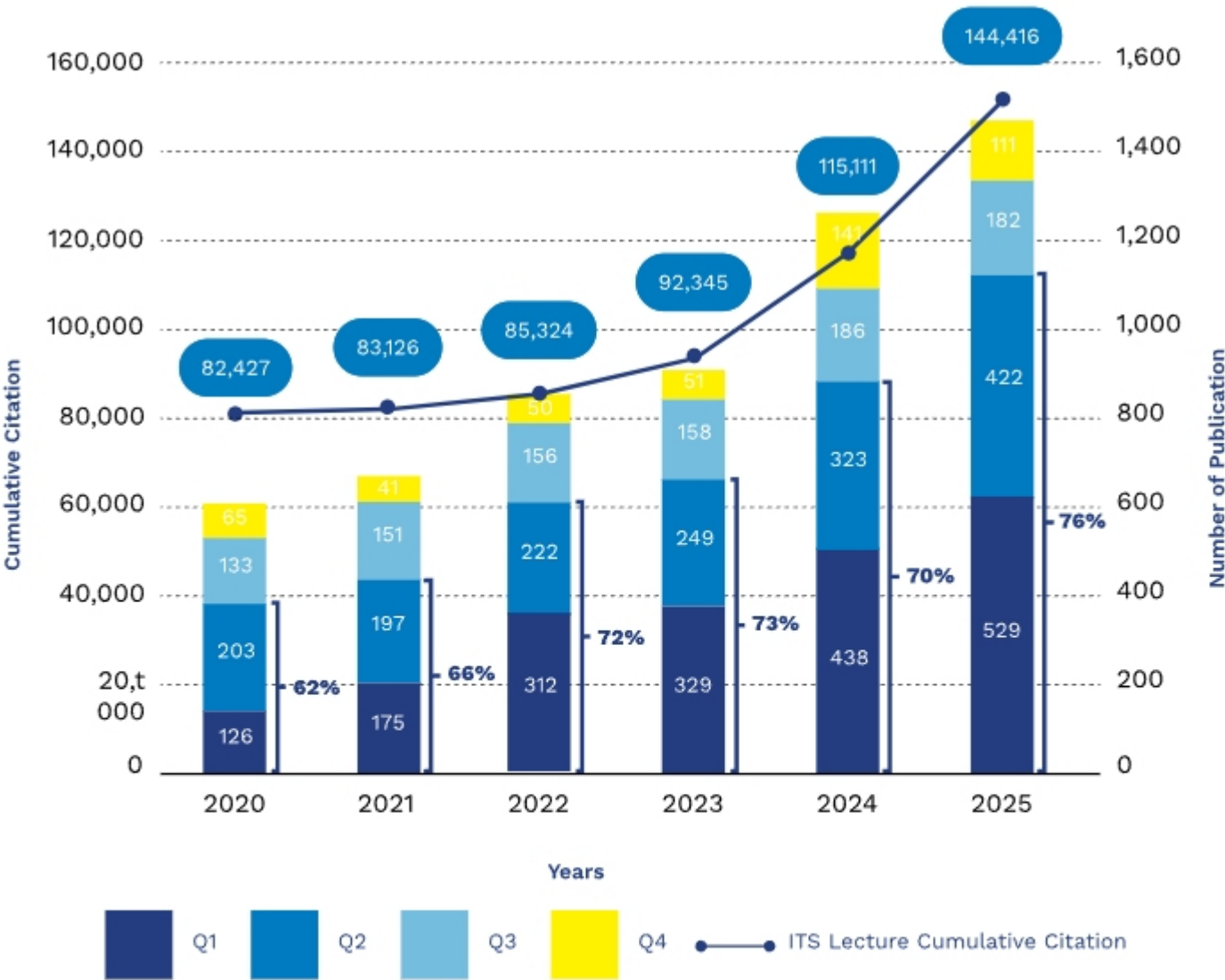


Number of Top Tiers Publications 2020 - 2025

ITS has demonstrated an extraordinary trajectory in top-tier journal publications, reflecting a highly effective institutional research framework. Between 2020 and 2025, the university consistently elevated its standing among the seven leading State University with Legal Entity Status (Perguruan Tinggi Negeri Badan Hukum or PTNBH), ascending from 6th position in 2020 to securing the 2nd rank in 2024—a distinction it successfully maintained through 2025.

This sustained performance underscores a robust research strategy that has empowered ITS to outperform major peer institutions in terms of high-impact scholarly output. Central to this success is the consistent growth of ITS's top-tier publications, which surged from 10% in 2020 to 26% in 2024, reflecting the intensifying global impact and visibility of the university's research.

While other prominent institutions, such as ITB and UI, exhibited more moderate fluctuations during this period, ITS's continuous upward momentum serves as a benchmark for strategic research investment. This trajectory not only validates the efficacy of the university's internal policies but also solidifies ITS's elite position as a premier research hub within the PTNBH group.



Pioneering Indonesian Robotics and Rover Innovation

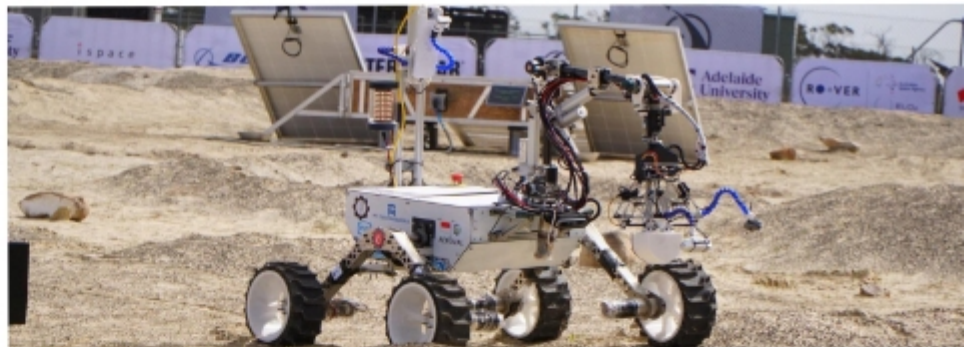
One concrete manifestation of this established research culture can be seen through the ITS RIVAL Team. Founded in 2021, RIVAL is the youngest robotics research team at ITS, focusing on the development of thematic robots and space exploration rovers. Despite its status as a relatively new team, RIVAL has successfully recorded a range of notable achievements at both national and international levels.

General Manager of the ITS RIVAL Team, Aditya Dharma Saputra, explained that these achievements are closely linked to the distinctiveness of the team's innovations, which enable them to develop robots with different themes each year in accordance with the challenges presented in competitions. In 2024, the team developed a waste-sorting robot capable of separating waste based on material type and color.

In addition, the limited scope of space technology research and development in Indonesia encouraged the ITS RIVAL Team to initiate research in rover technology. This initiative has positioned RIVAL as the first rover research team in Indonesia to consistently develop innovations in this field. Through this research, the ITS RIVAL Team seeks to broaden its contribution to space exploration and future robotics technology.

The dedication of the ITS RIVAL Team has yielded significant results, including first place at the Kontes Robot Tematik Mahasiswa Indonesia (KRTMI) at the national level in 2021, 2022, and 2024, as well as First Honorable Mention in 2023. At the international level, the team also ranked sixth at the Australian Rover Challenge 2026 and received the Best Rookie Team award.

Innovation grows
through curiosity,
collaboration,
and continuous
exploration.





Research becomes meaningful when it creates solutions for future challenges.



Driving the Future Through Sustainable Transportation

The spirit of research and innovation is also reflected in the work of the ITS Spektronics Team, which focuses on the development of Chem-E-Car, a prototype vehicle powered by energy generated from chemical reactions. Through its various studies, the ITS Spektronics Team continues to explore alternative energy sources, including Al-Air batteries, Zn-Mn batteries, and the utilization of gas pressure generated from chemical reactions as a source of vehicle propulsion.

External Affairs Officer of the ITS Spektronics Team, Nayla Muli Fathia, explained that the team's innovations aim to develop vehicle technology that is more efficient, economical, and environmentally friendly. The development of alternative energy sources represents one of ITS's contributions to support the transition toward sustainable transportation technology, which is increasingly needed in the future.

The consistency of Spektronics' research and innovation has also brought the team a number of prestigious awards. At the national level, Spektronics has recorded achievements in various competitions, including First and Second Place, Best Presentation, and Most Eco-Friendly Car at the International Chem-E-Car Competition and Conference (ICRCC) 2026, along with other accomplishments at the AIChE Indonesia Student Conference (AISC).

On the international stage, the team, which was established in 2010, won First Place at the Vehicle Design Innovation (VDI) 2024 in Germany, as well as the Regional AIChE Chem-E-Car Competition in India in 2023. In addition, the ITS Spektronics Team received a Gold Prize at the Seoul International Invention Fair (SIIF) 2025, along with several other special international awards.

Every achievement reflects a strong commitment to excellence and global impact.



The research culture developed by ITS has become an important force in strengthening the Campus of Heroes' position on the global stage. Moving forward, ITS remains committed to continuously improve both the quality and quantity of research oriented toward global impact. With this spirit, ITS is optimistic about strengthening its contribution to national development while accelerating its progress toward becoming a world-class university. **(rea/zan)**



Benwit, A Spark of ITS Innovation Toward National Energy Self-Reliance

This Article Supports SDG 7 and SDG 12
Affordable and Clean Energy; Responsible Consumption and Production



In the spirit of strengthening Indonesia's energy self-reliance, Institut Teknologi Sepuluh Nopember (ITS) continues to produce innovations that address the needs of society and industry. The RAISE strategic framework introduced by the Rector of ITS, Prof Ir Bambang Pramujati ST MScEng PhD, has positioned ITS to prioritize visionary, adaptive research capable of delivering practical technological solutions. One manifestation of this commitment is ITS's active role as an accelerator of research to strengthen national energy security.

This pursuit of energy self-reliance is reflected in an innovation initiated by a professor from the ITS Department of Materials and Metallurgical Engineering, Prof DrEng Hosta Ardhyanta ST MSc. Known as Bensin Sawit (Benwit), the innovation is a plant-based fuel developed as a sustainable energy alternative. Amid mounting dependence on dwindling fossil-fuel reserves, Benwit reflects ITS's responsiveness to society's evolving energy needs.

Innovation Responsive to Change

Indonesia once enjoyed an era as one of the world's leading crude-oil exporters. As national energy demand has grown and production conditions have shifted, the country now meets part of its fuel consumption through imports. These circumstances have spurred academics to develop sustainable energy innovations to bolster national energy security and self-reliance.

Responding to this, Hosta noted that Indonesia, as a tropical nation, enjoys significant natural advantages in the development of alternative energy sources. One example is oil palm, which holds great promise as a source of green energy in Indonesia. "Unlike fossil fuels, which take hundreds to thousands of years to form, oil palm fruit takes only three years to mature before it can be harvested and processed," he said.

Observing that roughly 70 percent of national energy demand is still met by imported crude oil, Hosta called for greater energy self-reliance by harnessing plant-based resources such as oil palm. He believes that although palm-based fuels have been widely studied at various universities, Benwit offers a distinct advantage in terms of product quality. "The gasoline content of Benwit is relatively high compared with that reported in studies conducted over the past three years," he explained.





Turning Palm Oil into Benwit

The professor, whose research focuses on materials innovation, explained that Benwit is produced from crude palm oil (CPO). The process begins with sorting oil palm fruit by ripeness, followed by sterilization using hot steam at 100 – 200 degrees Celsius. This step kills bacteria while softening the fruit.

Oil palm fruit of the genus *Elaeis* is then pressed to extract its essence, which is subsequently purified into CPO. Afterward, the CPO undergoes fractionation to separate the olein and stearin fractions before being processed through catalytic cracking. "This process uses an alumina catalyst that acts as a molecular scissor to break down the triglycerides in CPO," Hosta said.

Hosta explained that catalytic cracking can split a single carbon chain into three types of product—biodiesel, kerosene, and biogasoline—the latter of which is further developed into Benwit. Through this approach, the biogasoline conversion yield can reach approximately 60 percent at a furnace operating temperature of around 350 degrees Celsius.

Using materials chemistry, a single carbon chain can be split into three types of oil products

– Hosta





Clean-Energy Solutions for the Nation

To ensure Benwit's quality, Hosta conducted a series of laboratory tests, including viscosity testing, Fourier Transform Infrared (FTIR), Scanning Electron Microscope (SEM), and X-Ray Diffraction (XRD) analyses. Benwit has also been tested on a motorcycle through a blending method with Peralite at 10 percent. "The test results indicate that Benwit has a Research Octane Number (RON) of 115," he noted.

In light of that potential, Hosta plans to develop the production of Benwit biogasoline on a larger scale. He also called on the government, regulators, and other stakeholders to collaborate in advancing the innovation. "I plan to expand the research on Benwit processing so it can produce even more biogasoline," he said.

Hosta hopes Benwit will mark another step toward national energy self-reliance while inspiring further innovations from the ITS academic community. The effort also supports the achievement of the Sustainable Development Goals (SDGs), particularly Goal 7 on Affordable and Clean Energy and Goal 12 on Responsible Consumption and Production. **(ary/dan)**





Charting the Future of Indonesia's Food Security Through **Agricultural Machinery**

This Article Supports SDG 8 and SDG 9
Decent Work and Economic Growth; Industry, Innovation, and Infrastructure



ITS extend their sincere gratitude to the **Ministry of Agriculture of the Republic of Indonesia** and **Minister of Agriculture, Dr. Ir. H. Andi Amran Sulaiman, M.P.** for their invaluable support in advancing the development and commercialization of agricultural machinery and equipment developed by ITS.

Indonesia is currently facing increasingly complex global challenges. The threats of food, energy, and water crises demand the emergence of various breakthroughs capable of meeting future needs. In response, Institut Teknologi Sepuluh Nopember (ITS) has introduced agricultural machinery (*alat dan mesin pertanian* or *alsintan*) designed to support agricultural productivity while strengthening national food security.

To date, ITS's *alsintan* have taken the form of an electric boat tractor capable of operating on peatland and the Moto Climber ITS (MOCITS), a device designed to assist coconut harvesting. Driven by the real needs of farmers, this strategic initiative has earned ITS the trust of the Indonesian Ministry of Agriculture to support the development of a more advanced, efficient, and sustainable agricultural sector in Indonesia.



A Strategic Vision for Technology Downstreaming

Vice Rector IV of ITS, Prof Ir Agus Muhammad Hatta ST MSi PhD, emphasized that government support plays an important role in producing research that has a real impact on society. He also expressed appreciation for the Indonesian Ministry of Agriculture's trust in ITS's research outcomes for further development and application. Through collaboration with the government, university research also gets the opportunity to reach the stage of commercialization.

Moreover, according to Hatta, as he is familiarly called, the Ministry of Agriculture's presence as an early adopter serves as an important bridge for refining product quality. Consequently, ITS's research products will not remain at the laboratory stage but will also be ready for mass production. "We will utilize this procurement support as a form of evaluation to demonstrate the highest quality of research products in the future," explained the engineering physics expert.

Going further, Hatta noted that support from the Indonesian Ministry of Agriculture underscores the importance of encouraging research in agricultural machinery and practical technologies developed by local talent. *Alsintan* stands as concrete proof that Indonesia is capable of meeting its agricultural needs independently. "In this way, we don't have to rely on imported goods," Hatta said.

An Electric Tractor That Cleaves Through Peatland

The first product of these *alsintan* is the electric boat tractor which offers a clever answer to the management of agricultural peatland. Prof Dr Ir Bambang Sudarmanta ST MT IPM AEng, the product's innovator, explained that the main challenge in areas outside Java lies in muddy and waterlogged soil conditions. Furthermore, the use of conventional diesel engines is often constrained by the heavy equipment required and the difficulty of accessing diesel fuel in remote areas.

Drawing on these conditions, the electric boat tractor was designed with a flat pontoon-like to provide optimal buoyancy in watery terrain. This design keeps the tractor stable and prevents it from sinking while plowing flooded fields. "The boat-like body is designed to provide sufficient buoyancy for the tractor when operating on peatlands," Bambang explained.

Moreover, the tractor is driven by a 10-kilowatt Permanent Magnet Synchronous Motor (PMSM), which boasts an efficiency rate of up to 94 percent. This green electric powertrain is supplied by a 72-volt Lithium Iron Phosphate (LiFePO₄) battery, which is precisely managed by a Smart Battery Management System (BMS) to ensure safe operation. "We equipped the electrical system with an intelligent controller to optimize battery energy use and extend battery life," he noted.

In addition, the Lecturer from the ITS Department of Mechanical Engineering further explained that the functional aspect of this machinery is enhanced by a hydraulic system, which allows operators to easily adjust the position of the front wheels and the rotary tiller unit. The transmission system utilizes a chain-drive mechanism to transfer power from the electric motor to the wheels, ensuring stable power delivery. Operational safety is further enhanced by a responsive hydraulic disc braking system.





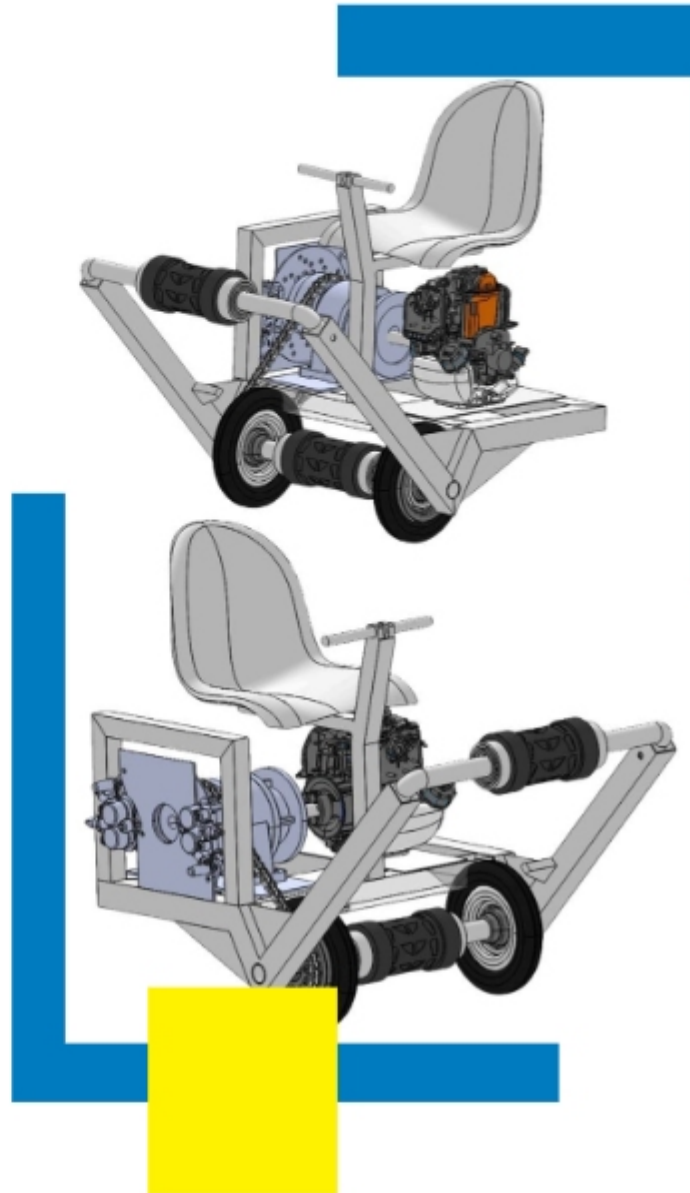
The system also includes Internet of Things (IoT)-based features for easier monitoring. Farmers can track battery status, voltage, current, and motor temperature in real time to prevent malfunctions during work. "This tractor offers considerable energy flexibility because its battery can be recharged using either electricity from PLN or solar power," he added.

MOCITS, the Conqueror of Heights

In the plantation sector, ITS presents the Moto Climber ITS (MOCITS) as a clever solution to reduce the risk of workplace accidents for coconut farmers. MOCITS innovator, Ir Achmad Syaifudin ST Meng PhD, noted that Indonesia is the world's largest coconut producer. However, the limited availability of skilled climbers has become a major challenge. This tool helps reduce harvesting risks while making the work safer and more efficient.

The MOCITS's operating principle relies on the friction of hard rubber wheels that securely grip the tree trunk, enabling it to move vertically upward. The tool is powered by a drive motor connected to a double-chain transmission system that transfers power to the drive wheels. "The climbing mechanism is designed for vertical movement along the tree trunk, with the rubber wheels providing the grip needed for stable operation," explained the lecturer from the ITS Bachelor Program of Medical Technology.

The main advantage of MOCITS lies in the flexibility of its arm, which can adapt to various coconut tree diameters. Unlike comparable foreign prototypes, its articulated arm follows the contour of the tree trunk without requiring the operator to change seating position.



"The arm is designed to be highly flexible, allowing the operator to remain in a stable position even as the tree's diameter changes with height," he shared.

Delving deeper, the man familiarly known as Syaifudin explained that safety is an absolute priority in implementing the automatic braking system. This aims to prevent the tool from slipping suddenly. Furthermore, this system ensures that the machine can immediately lock in position when the operator releases the throttle, minimizing the risk of system failure.

Beyond the mechanical systems, operators are required to wear a safety harness firmly connected to both the device and the tree as a double layer of protection. The use of this safety equipment is essential to keep operators safe even when working at extreme heights. "We include a complete safety package in the form of an interlocking harness connecting the operator, the device, and the coconut trunk," he pointed out.

From an economic perspective, the use of MOCITS can boost farmers' production capacity up to threefold compared with the exhausting manual climbing method. The successful development of this appropriate technology demonstrates the capacity of university research to deliver practical solutions to the challenges faced by communities across the country's most remote regions.





MTE 09 Strengthens Food Security

Beyond developing technologies that support the agricultural sector, ITS is also contributing to Indonesia's national food security through the development of the superior MTE 09 hybrid maize variety. According to ITS Department of Biology lecturer, Mukhammad Muryono SSi MSi PhD, the variety represents one of the university's tangible efforts to address the growing challenges faced by Indonesia's agricultural sector.

Muryono explained that the development of MTE 09 was driven by increasingly complex cultivation challenges brought about by climate change. Higher rainfall and frequent flooding in agricultural fields have heightened the risk of crop diseases, resulting in declining harvest productivity in many farming regions. "In response to these challenges, we conducted extensive scientific research and developed a hybrid maize variety that has been rigorously tested under real field conditions," he said.

MTE 09 offers several advantages, both in its physical characteristics and its resistance to major crop diseases. It features distinctive kernel coloration, while its cob and rachis possess a unique rim structure that serves as an authentic identifier of the variety in Indonesia. Furthermore, Muryono noted that MTE 09 demonstrates strong resistance to downy mildew, stalk rot, and ear rot—three of the most significant diseases affecting maize cultivation.

The Tohoku University doctoral graduate also highlighted the variety's robust stalk, which enables the plant to withstand strong winds commonly encountered in open agricultural fields. In terms of productivity, MTE 09 is capable of producing up to 10 tons of maize per hectare and typically develops two ears per plant. This achievement aligns with the Indonesian government's efforts to increase national maize productivity, a key priority emphasized by the Minister of Agriculture.

To ensure that the benefits of this research reach farmers across the country, Muryono and his team designed MTE 09 to be easy to cultivate without requiring complicated or specialized farming practices. The commercialization and distribution of its seeds are supported by three partner companies in collaboration with Indonesia's Ministry of Agriculture, ensuring the availability of high-quality seeds for farmers. "We hope this innovation will serve as a practical solution to enhance agricultural productivity while strengthening Indonesia's national food security," Muryono concluded.

Through the innovation of the electric boat tractor, MOCITS, and MTE 09, ITS supports the Sustainable Development Goals (SDGs), specifically Goal 9 regarding Industry, Innovation, and Infrastructure, as well as Goal 8 regarding Decent Work and Economic Growth. Closing their statements, Bambang, Syaifudin, and Muryono expressed hope that both agricultural machinery products will enhance productivity in the agricultural and plantation sectors, both in terms of harvest yield and downstream products. (afa/rea/bil)





Antipest Wind Turbine Innovation Brings **TERANGIN** to the International Stage

This Article Supports SDG 7 and SDG 13
Affordable and Clean Energy; Climate Action



Amid the growing urgency for an energy transition, Institut Teknologi Sepuluh Nopember (ITS) consistently produces accomplished young innovators. One example is Muhammad Hanif, who founded PT Terangin Terang Sedunia, a high-achieving startup focused on renewable energy solutions. Starting with national acclaim, his wind-turbine innovation has now gained international recognition.

The Beginning of the Innovation

The interest of the Chief Executive Officer (CEO) and Founder of Terangin in wind turbines took root back in high school. As part of an assignment for the Pancasila Student Profile Strengthening Project, the young man familiarly known as Hanif was challenged to explore ways of harnessing renewable energy. That simple project later became the foundation for the development of Terangin's technology.

Drawing on that challenge, Hanif looked to the potential of his home region, Nganjuk Regency, East Java. Nicknamed the City of Wind, the area benefits from strong and steady winds throughout the year. Seeing this untapped potential, he sought to transform it into a renewable energy solution. "Because of that unique geographic potential, I eventually decided to focus on developing wind-turbine technology," he said.

During his time at university, Hanif carried this wind-turbine innovation forward by co-founding Terangin with like-minded peers. The team brings together expertise in mechanical engineering and physics for turbine design, along with statistics and business management for product commercialization. This multidisciplinary collaboration has become one of the team's strengths in competing internationally.

Earning Achievements, Gathering Trust

This multidisciplinary collaboration has yielded a string of impressive achievements throughout 2025. Terangin began 2025 by securing a place among the Top 10 Startups at PLN ICE before winning First Place in the Futurest Business Plan Competition 2025. To close the year, the team, whose name is an acronym of *terang* (light) and *angin* (wind), successfully secured a place among the Top 3 Startups at the prestigious Pertamina World Student Pitch Contest 2025.



Alongside these achievements, Terangin also continued to expand its business operations. In July 2025, the startup officially transitioned into a limited liability company (PT/LLC). This strategic move was taken to strengthen its legal and professional standing, while also building trust and attracting interest from several investors. "Working in renewable energy, many were willing to provide additional capital," said the ITS Mechanical Engineering student.

The funding has been used to purchase production equipment and improve operational efficiency. It has also supported several pilot projects in different locations, which were essential for testing the technology's reliability under real field conditions.



Wind Energy for Pest Control

As the company grew, Terangin began to place greater emphasis on addressing challenges faced by local communities. The wind turbines it develops are no longer intended solely for competitions and innovation showcases, but are increasingly designed to provide practical solutions for society. One such initiative focuses on shallot farmers in Nganjuk.

Based on field observations, Hanif explained that shallot farms require adequate night-time lighting to help reduce pest attacks and lower pesticide use by up to 80 percent. However, conventional lighting installations have not been able to cover the vast stretches of farmland. "Across wide fields far from access to electricity, farmers still depend on pesticides," he said with concern. To address this challenge, Terangin provides

electricity to agricultural areas through wind-powered systems. The presence of these wind turbines enables night-time lighting as part of an anti-pest system. In addition, the electricity generated can also support agricultural irrigation systems.

Terangin's Flagship Products

From a technological standpoint, Terangin, a graduate of the Pertamina Seed & Scale 2025 program, offers two flagship products: the Energi Box Terangin and the Terangin Wind Turbine Package. Energi Box functions as an energy storage system that stores electricity generated by solar panels and supplies it when needed. "In simple terms, it is a battery-based energy storage system equipped with integrated electronic components," Hanif explained.

As for its main product, the Terangin founder explained that the Wind Turbine Package consists of a tower, a turbine, and a panel box. The nine-meter-tall turbine is capable of generating 2.1 kilowatt-hour of electricity per day. He went on to say, "The turbine converts wind energy into electricity through a generator connected to the rotor blades."

One of the key innovations is a movable base that enables the turbine to be relocated without requiring a permanent installation. Its portable design makes field assembly and disassembly more efficient. Another distinctive feature is the use of a wind brake to protect the turbine from extreme weather conditions.

Moving forward, Terangin plans to expand the implementation of its pilot projects to more regions. The success of these trials in East Java has encouraged the team to broaden its reach further.

Our hope is to expand this initiative beyond Java and eventually reach international markets

– Hanif

The team's international recognition reflects the growing impact of its innovation. Thanks to their commitment to research and innovation, Hanif and his team secured a place among the Top 6 at the Fowler Global Social Innovation Challenge 2026 in San Diego, United States. The achievement also supports the Sustainable Development Goals (SDGs), particularly Goal 7 on Affordable and Clean Energy and Goal 13 on Climate Action. (jec/ann)





ITS Endowment Fund Raises from Donation Campaign to More Equitable Education

This Article Supports SDG 1 and SDG 4
No Poverty; Quality Education



Small Contributions Drive Equitable Education

Ir I Putu Eka Widya Pratama SSi MSc

Lecturer Department of Instrumentation Engineering ITS,
Faculty of Vocation (F-VOCATION)

Daily interactions with students have made this lecturer, affectionately known as Eka, deeply familiar with the struggles many undergraduates face in pursuing higher education. He frequently encounters students compelled to take on part-time work, some even at risk of discontinuing their studies altogether due to financial constraints. His own experience of financial hardship during his college years has only reinforced his conviction that educational assistance can be a decisive factor in shaping a person's future.

Since then, the Bali-born academic has committed to becoming a regular donor to the ITS Endowment Fund. For him, meaningful impact does not require a substantial contribution.

He believes that modest donations, given consistently, will continue to grow and help an increasing number of students access a proper education. Driven by this conviction, he hopes more members of the ITS academic community will choose to participate, as even a single rupiah, given sustainably, can become a source of hope for those in need.

“Seeing students smile and offer their heartfelt gratitude is truly gratifying.”

Agus Dwi Purwolastono

Head of Administrative Affairs, Faculty of Electrical Engineering,
Information Technology, and Computer Science (F-ELECTICS) ITS

Agus's decision to contribute to the ITS Endowment Fund was inspired by the spirit of fellow members of the ITS community, who consistently uphold the principle that no student should be forced to abandon their studies due to economic hardship. To him, the endowment fund represents a collective expression of care, ensuring that every student is afforded an equal opportunity to pursue an education. Agus firmly believes that every contribution, however small, holds genuine significance in realizing this shared goal.

Born in Surabaya, he hopes the ITS Endowment Fund will continue to expand into a robust and sustainable source of funding.

He is convinced that the larger the fund grows, the greater the benefits students stand to gain. To that end, Agus encourages the entire ITS academic community not to hesitate in contributing, as even modest acts of collective care can generate a substantial impact on the future of education at ITS.

“It doesn't have to be large — what matters is that it is given regularly and with sincerity.”

Raihan Fadhlurrahman

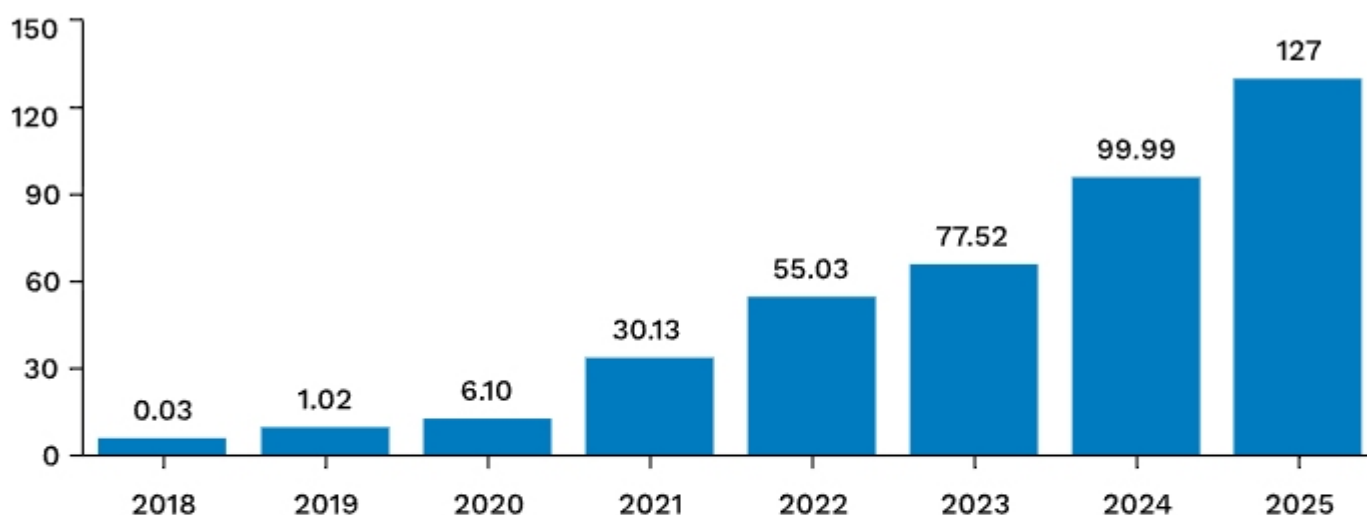
Student, Department of Civil Infrastructure Engineering, Faculty of Vocation (F-VOCATION) ITS; Awardee, ITS Endowment Fund Scholarship

The ITS Endowment Fund scholarship Raihan received has served as a vital financial anchor, allowing him to navigate university life with greater peace of mind. Coming from a lower-middle-income family, he once grappled with persistent anxiety over tuition fees and daily living expenses. Since receiving the scholarship, however, that burden has gradually eased. "I've been able to focus on my studies and stay active in other pursuits without being weighed down by financial concerns," he remarked.

Beyond the assistance he has received, this member of the class of 2023 wishes to express his gratitude by striving for achievements that bring pride to ITS, affectionately known as the "Campus of Heroes." For Raihan, the ITS Endowment Fund stands as a tangible manifestation of the campus's and its donors' commitment to the nation's youth and their education. He therefore hopes the program will continue to reach an even greater number of students in need, so that every generation is granted an equal opportunity to pursue their dreams.



Accumulation of ITS Endowment Fund Annual Income (in Billion IDR)



As a part of efforts to promote more equitable and sustainable access to education, ITS Endowment Fund serves as a tangible manifestation of collective social responsibility. This initiative not only establishes an alternative and sustainable source of funding, but also represents a strategic step toward enhancing the financial independence of ITS. Based on professional, transparent, and accountable management by ITS Endowment Fund Management Board (Lembaga Pengelola Dana Abadi or LPDA), the funds collected are allocated to support the continuity of students' education, foster research development, and stimulate innovation as a meaningful contribution to the nation.

Monthly Endowment Fund Donation as of June 2026

Description	Amount of Endowment Fund (IDR)
2025 Endowment Corpus	127,449,562,467
ITS Budget 2025	25,000,000,000
January 2026 Donation	27,422,001
February 2026 Donation	124,949,603
March 2026 Donation	44,443,143
April 2026 Donation	234,186,381
May 2026 Donation	26,365,006
June 2026 Donation	156,659,512
Accumulation as of June 30th 2026	153,063,588,113

Recapitulation of ITS Endowment Fund Scholarship

Scholarship Type	Amount of Scholarship Fund (IDR)	Scholarship Awardee
ITS Endowment Fund Scholarship - Tuition Fee Even Semester of 2021	196,500,000	61 Students
ITS Endowment Fund Scholarship - Tuition Fee Odd Semester of 2022	204,000,000	62 Students
ITS Endowment Fund Scholarship - Tuition Fee Even Semester of 2023	228,000,000	63 Students
ITS Endowment Fund Scholarship - Tuition Fee Odd Semester of 2023	220,300,000	63 Students
ITS Endowment Fund Scholarship - SPI/SPA Odd Semester of 2023	1,582,500,000	46 Students
ITS Endowment Fund Scholarship - Tuition Fee Even Semester of 2023	252,900,000	63 Students
KIPK Scheme 2 Living Allowance Odd Semester of 2023	1,878,000,000	313 Students
KIPK Scheme 2 Living Allowance Even Semester of 2023	1,840,600,000	309 Students

Scholarship Type	Amount of Scholarship Fund (IDR)	Scholarship Awardee
ITS Endowment Fund Scholarship - Tuition Fee Odd Semester of 2024	231,500,000	64 Students
KIPK Scheme 2 Living Allowance Odd Semester of 2024	1,837,600,000	308 Students
ITS Endowment Fund Scholarship - Tuition Fee Even Semester of 2024	344,500,000	64 Students
KIPK Scheme 2 Living Allowance Even Semester of 2024	1,821,600,000	305 Students
ITS Endowment Fund Scholarship - Tuition Fee Odd Semester of 2025	321,400,000	65 Students
KIPK Scheme 2 Living Allowance Even Semester of 2025	1,407,600,000	236 Students
Lustrum XIII Scholarship Year 2025	78,000,000	13 Students
Future Leaders Scholarship Year 2025	375,000,000	50 Students
KIPK Scheme 2 Living Allowance Odd Semester of 2026	1,410,600,000	237 Students
Accumulation as of June 30th 2026	14,230,600,000	2,322 Students

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ITS's Mining Engineering Breaks the Stigma of the Earth-Sciences Industry

This Article Supports SDG 4, SDG 7, and SDG 14
Quality Education; Clean Energy; Responsible Production and Consumption



As the mining industry continues to develop, the urgency of energy transition and sustainable natural resource management has become increasingly prominent. In response to these challenges, Institut Teknologi Sepuluh Nopember (ITS) has established the Mining Engineering Study Program under the Department of Geomatics Engineering, Faculty of Civil, Planning, and Geo Engineering (F-CIVPLAN).

The establishment of this new study program marks a significant milestone in strengthening ITS's role as a center of innovation to support national energy sovereignty. This initiative is grounded in the urgency of the global energy transition and the growing need for local talent capable of independently advancing earth sciences and engineering technologies. Through a technology-driven engineering approach, ITS is committed to prepare a resilient generation of professionals who are not only technically competent but also deeply aware of the importance of sustainable environmental stewardship.

Head of the ITS Mining Engineering Study Program, Hepi Hapsari Handayani ST MSc PhD, explained that Indonesia's abundant natural resources are still largely managed with the involvement of foreign expertise. For this reason, the program was strategically established to enrich the university's academic ecosystem while addressing the nation's need for greater self-reliance in the sector.

This initiative is also driven by the limited number of similar study programs in Indonesia that focus on managing the nation's natural resources

— Hepi



Curriculum and Alignment with a Sustainable Industry

Committed to addressing the gap in extraction engineering—the discipline concerned with the responsible utilization of the Earth's resources—the ITS Mining Engineering Study Program was established with a broader vision and mission. This commitment is reflected in its mining technology education, which emphasizes the principles of green mining and sustainability while fostering students with strong integrity and professional competence.

The program's strategic strength lies in the integration of two main pillars: Digital Mining and Green Sustainable Mining. Within the Digital Mining pillar, these principles are embedded into both the curriculum and the Semester Learning Plan (Rencana Program Studi or RPS). Hepi explained that artificial intelligence (AI) and digital autonomous systems are introduced from the early stages of study, with students required to take the Data Literacy and Artificial Intelligence course as early as the third semester.

In addition, the program offers a range of elective courses, including Deep Learning for Mining, Autonomous Mining Equipment, and Digital-Based Mine Valuation, to broaden students' understanding of future-oriented mining technologies. "Cross-faculty teaching collaboration is also provided to broaden students' perspectives and deepen their expertise in specific fields," she added.

This academic collaboration is further realized through the concept of Green and Sustainable Mining. One example is the use of AI to determine mining locations through precise coordinate-based mapping. Beyond this, students are also equipped with the knowledge to calculate biomass and estimate the initial carbon sequestration capacity of trees based on their diameter and height.

According to Hepi, this capability is essential to ensure that graduates are able to design post-mining land rehabilitation processes in a more measurable and systematic manner. Through this approach, environmental restoration is no longer regarded merely as an administrative requirement, but as an integral part of the mining process that is planned from the outset. "Students are also encouraged to develop innovations in utilizing mining residue to minimize environmental impacts," she stated.

A Foundation of Quality Assurance

Beyond its adaptive curriculum and future-oriented learning approach, ITS also ensures the quality of the program's implementation through a comprehensive quality assurance process. The university's strong commitment and strategic efforts in establishing this new study program have yielded significant results. Based on the decision of the Independent Accreditation Agency for Engineering Programs (Lembaga Akreditasi Mandiri Teknik or LAM Teknik), the ITS Mining Engineering Study Program has obtained an initial accreditation rating of "Good."



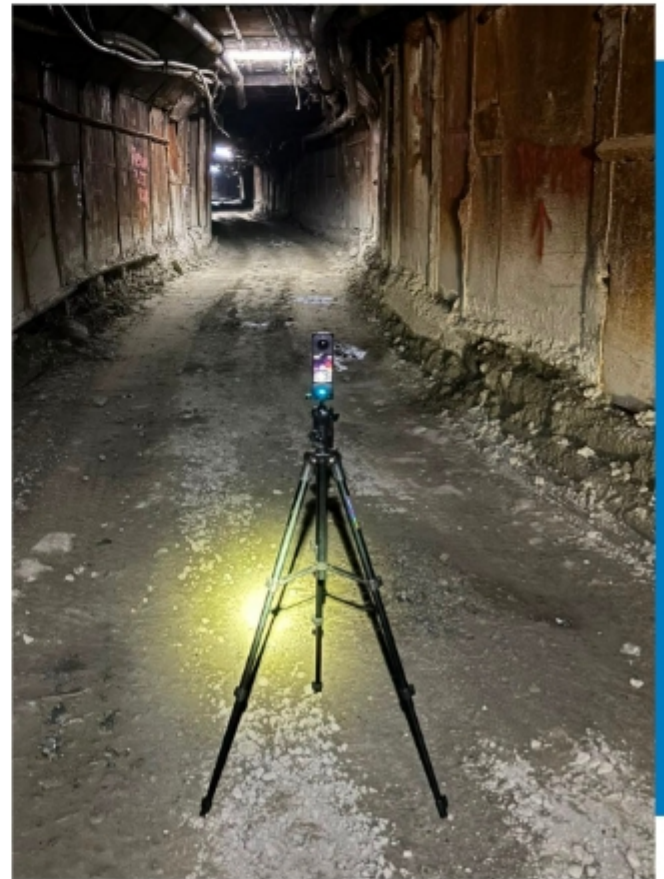
This initial accreditation serves as formal recognition that the program's educational instruments have met the eligibility standards set by the government. Practical learning is further supported by a range of industry-standard laboratories and lecturers with extensive experience in the mining sector.



"The synergy of cross-departmental facilities at ITS serves as a key asset to support students' research, making it more comprehensive and applicable,"

added the Head of the ITS Center for Disaster Mitigation and Climate Change Studies.

Through the establishment of this program, ITS further strengthens its contribution to the achievement of Sustainable Development Goals (SDGs) 4, 7, and 12, which respectively focus on Quality Education, Clean Energy, and Responsible Consumption and Production. "This commitment is further reinforced by the firm application of sustainable mining principles to ensure the long-term sustainability of post-mining environments," she concluded. (din/mif)



Highlights of ITS **Synergy** and **Transformation** in 2026









Through a Clean Water Installation, ITS Aids Post-Disaster Recovery in Aceh

This Article Supports SDG 6
Clean Water and Sanitation



Deep sorrow enveloped the people of Aceh following the flash floods and landslides that struck several areas in late 2025. The disaster not only damaged homes and public facilities, but also left residents struggling to access clean water. Water sources that had long supported daily needs became unsafe for consumption, contaminated by mud and large amounts of debris carried by the floodwaters.

Responding to these conditions, Institut Teknologi Sepuluh Nopember (ITS) provided a solution through an innovative clean water installation based on electrocoagulation technology. This technology is capable of treating contaminated water into a cleaner and more usable form for influenced communities. More than a form of emergency assistance, this innovation reflects ITS's concrete contribution to address the clean water crisis in the aftermath of the Aceh disaster.



Technology for Affected Areas

Developed as an effort to improve community access to clean water, the installation was initiated by Prof Arseto Yekti Bagastyo ST MT MPhil PhD, together with a team from the ITS Department of Environmental Engineering. One of the initiators of the innovation, Ervin Nurhayati ST MT PhD, explained that the system operates based on the principle of electrocoagulation. “This method uses electrically charged electrode plates to precipitate impurities in the water without requiring chemical additives,” she explained.

To further enhance the quality of the treated water, the team also incorporated a fine-particle filtration membrane and ultraviolet light technology to eliminate pathogenic bacteria. Supported by ITS Civil Engineering alumni and the ITS Center for Sustainable Infrastructure and Environment Studies, the installation is designed to operate continuously with a capacity of 2,000 liters of clean water per hour.

This device can meet the clean water needs of hundreds of households

– Ervin

After undergoing various stages of development, the technology was deployed at Pesantren Raudhatul Mukarramah Al Aziziyah in Pidie Jaya Regency, Aceh. The *pesantren* (Islamic boarding school) was selected because it has direct access to a raw water source and serves as a center of activity for the surrounding community. This strategic location enables clean water distribution to reach a larger number of residents while ensuring the continued operation of the installation through supervision by the *pesantren* authorities.

The presence of this clean water installation has brought a new hope to the disaster-affected community. Amidst limited access to clean water, the system is able to provide a sustainable supply to help meet residents' daily needs more adequately. Nevertheless, bringing technology into a disaster-affected area presents its own set of challenges.



Overcoming the Challenges of Disaster-Affected Areas

In their efforts to provide clean water access for the people of Aceh, Ervin and her team encountered various challenges in the field. One of the main challenges was ensuring that the installation could be deployed quickly to affected areas with limited accessibility. At the same time, the water treatment unit has a relatively large capacity and consists of numerous supporting components that must remain fully functional.

To address this challenge, the team designed the installation in a more compact and easily mobilized form. By simplifying the system configuration, the device can continue to operate effectively while remaining practical to relocate according to field conditions. “This device is compact, allowing it to be transported easily using an open-bed vehicle to areas experiencing a clean water crisis,” she explained.



Another challenge emerged during the installation process. The limited electricity supply in the surrounding area, which had been disrupted by the disaster, temporarily obstructed the operation of the device. This obstacle was eventually resolved with support from PT Wijaya Karya, which helped provide a new electrical installation at the site. Once an adequate power supply was secured, the clean water installation was able to operate optimally and begin serving the surrounding community.

Sustaining Benefits for the Future

To ensure that the benefits of this clean water installation can be sustained, the ITS team also provided the students and *pesantren* administrators with basic training on device maintenance. From removing accumulated mud to periodically replacing electrodes, the maintenance procedures are designed to be carried out independently by the local community. “Community self-reliance in maintaining the device is the key to ensuring that the clean water supply continues,” Ervin stated.



The development of this technology does not stop in Aceh. ITS continues to refine the system to improve its performance and expand its potential application in other regions requiring clean water access. The Head of the ITS Laboratory of Environmental Quality Management explained that her team is still conducting various tests and improvements. In addition, a similar unit is kept on standby at ITS so that it can be deployed quickly should a clean water crisis occur in another area.

The success of this program is also supported by alumni, study centers, and various industry partners. This collaboration serves as an important fundamental for expanding access to clean water for communities, particularly in disaster-affected areas and emergency situations. At the same time, the initiative supports the achievement of the Sustainable Development Goals (SDGs), particularly Goal 6 on Clean Water and Sanitation. **(era/zik)**

Solar2Wave: A Floating Solar Power Solution for Indonesia's Energy Security

This Article Supports SDG 7 and SDG 8
Affordable and Clean Energy; Decent Work and Economic Growth



As a maritime nation, Indonesia has long utilized the sea primarily as a space for transportation and fisheries. Yet, above its vast waters, sunlight offers immense potential to power even the smallest islands. As land availability on the mainland becomes increasingly limited, marine areas present new opportunities for the development of solar energy.

Recognizing this potential, Institut Teknologi Sepuluh Nopember (ITS) has introduced an alternative approach. Rather than relying on vacant land on the mainland, the ITS research team turned its attention to the waters north of Probolinggo City. From this area, Solar2Wave was developed as a floating solar power plant designed to operate directly in marine environments.



Innovation for Equitable Electrification

Lead researcher of Solar2Wave Indonesia, Prof Ir I Ketut Aria Pria Utama MSc PhD, views the energy transition as an urgent agenda that can no longer be postponed. However, efforts to expand solar energy utilization at scale remain closely linked to the issue of space. Conventional solar panels require extensive land areas, while the use of lakes for floating solar power plants also presents limitations and has yet to offer a fully sustainable long-term solution.

The professor, familiarly known as Ikap, explained that lakes cannot be entirely covered with solar panels, as they must continue to support human activities while maintaining ecological balance. Excessive coverage of lake surfaces may also disrupt the organisms living within them.

“These limitations make the sea a more promising option for implementing Solar2Wave

– Ikap

At the same time, open-sea environments present challenges of their own, particularly wave instability, which can affect the performance of floating power plants. To address this issue, Solar2Wave uses solar panels mounted on floating structures and protected by a breakwater system to maintain structural stability. “This 25-kilowatt system is also equipped with battery storage, allowing electricity to continue flowing even after sunset,” said the Head of the ITS Center for Marine and Earth Science and Technology Studies.

The professor, whose expertise lies in ship hydrodynamics, explained that each Solar2Wave installation uses six monocrystalline and polycrystalline solar panels, with a total capacity of 600 watts. The system is also equipped with floating cubes that are resistant to ultraviolet exposure, seawater corrosion, chemicals, and oil. With these materials, Ikap added, Solar2Wave is designed to remain reliable for long-term operation in aquatic environments.





Born from International Collaboration

The idea behind Solar2Wave had emerged long before the first panel was installed at Gili Ketapang. Ikap recalled that the concept began through his discussion with Dr. Luofeng Wang from Cranfield University, United Kingdom, in 2022. From this academic exchange, the two researchers began formulating the idea of combining floating solar panels with wave-breaking technology to address operational challenges in marine environments.

The project later received funding support from Innovate UK, the United Kingdom's national innovation agency. Under this funding scheme, Achelous Energy Limited served as the project leader, facilitating academic and industrial collaboration in Indonesia. Meanwhile, ITS was entrusted to lead the Indonesian team, working in partnership with Universitas Pattimura and two industry partners, PT Gerbang Multindo Nusantara and PT Orela Shipyard.

Ikap further explained that the project roles were assigned according to each partner's area of expertise. The Cranfield University team was responsible for numerical testing and wave simulation using its water tunnel facility, while the ITS team managed the construction and installation process in the field. "This synergy enabled Solar2Wave to be successfully deployed and operated," said the lecturer from the ITS Department of Naval Architecture.

The collaboration also played an important role in addressing technical challenges that emerged during the development process. When the pontoon connection was damaged by wave impact, material support in the form of high-buoyancy styrofoam was provided by DuPont de Nemours from the United States. Ikap noted that this support was instrumental in sustaining the project's progress amidst limited research funding.



Illuminating the Lives of Coastal Communities

Ikap, who was born in Denpasar on April 6th, 1967, explained that the selection of Gili Ketapang was closely linked to the limited electricity supply faced by the local community. The 68-hectare island, located in the Madura Strait, is home to a fishing community that still relies on diesel generators as its main source of electricity. As a result, ice blocks used to preserve fish catches could not be produced locally and had to be transported from Probolinggo City.

With the introduction of this innovation, sunlight in Gili Ketapang no longer merely illuminates the coastline, but also powers an ice-making machine placed in a village-owned installation house. The Solar2Wave facility is capable of producing approximately 50 ice blocks at a more affordable cost compared to transporting them from Probolinggo City. “They no longer have to sail through rain and storms just to obtain ice blocks,” Ikap said with relief.

Community mentoring has also become an integral part of the Solar2Wave implementation process. For one year, Ikap, together with the ITS Center for Industrial Development and Public Policy Studies, assisted the local community in learning how to manage operations, maintain the installation, and organize the venture's finances so that the system could operate independently. He emphasized that the community's ability to sustain the innovation is a crucial factor in ensuring the program's continuity.



The success of Solar2Wave in Gili Ketapang demonstrates that the sea is not only a source of livelihood for coastal communities, but also holds significant potential for Indonesia's energy future. Drawing from this experience, Ikap hopes that similar technology can be implemented on more islands that still depend on diesel generators. “We hope this concept can be developed more broadly to support the nation's energy transition,” he concluded optimistically.

More than a technological innovation, Solar2Wave reflects ITS's commitment to supporting the achievement of the Sustainable Development Goals (SDGs). The project contributes to Goal 7 on Affordable and Clean Energy, Goal 8 on Decent Work and Economic Growth, and Goal 13 on Climate Action. The multi-stakeholder collaboration involved in its development also supports Goal 17 on Partnerships for the Goals. **(nor/rea)**

Prof Jaka Sunarso's Endeavor in Advancing Cross-Border Energy Research



This Article Supports SDG 7 and SDG 9
Affordable and Clean Energy; Industry, Innovation and Infrastructure



Prof Jaka Sunarso ST ME PhD CEng is a 2004 alumnus of the Department of Chemical Engineering at Institut Teknologi Sepuluh Nopember (ITS). He currently serves as Director of the Research Centre for Sustainable Technologies at Swinburne University of Technology, Sarawak Campus, Malaysia. His journey illustrates how the academic foundation established at ITS can empower its alumni to contribute to global strategic issues, particularly in the field of sustainable energy.

As an academic and researcher, Jaka focuses on batteries, fuel cells, membranes, biorefinery, as well as process modelling and simulation. These fields are closely connected to future global needs, especially in the development of energy technologies that are cleaner, more efficient, and more sustainable. From ITS, his academic journey has continued to evolve, extending across various international research institutions.

Academic Foundation from ITS

Jaka's interest in research began during his time as a student at ITS. Amidst the many industrial career paths available to engineering graduates, he instead developed a profound interest in academic inquiry. The Chemical Engineering Reading Room became one of the most memorable places for him. He spent much of his time reading, deepening his knowledge, and cultivating the academic discipline that would later shape the direction of his career.



For the recipient of the 2019 Research Excellence Award, Highly Commended, ITS provided not only technical knowledge, but also a disciplined way of thinking and a persistent spirit of seeking answers through research. A strong academic environment, conducive learning atmosphere, and the support of dedicated lecturers became formative experiences that he continues to carry throughout his career as a researcher.

He recalls how lecturers at ITS gave students opportunities to learn beyond the classroom, including by providing access to books and academic references. This experience became one of his early motivations to pursue research at the international level. "I feel fortunate to have had lecturers who did not hesitate to lend their books to students," said Jaka, who holds Professional Membership in the UK Section of the International Register of Professional Engineers from the Engineering Council.



Pursuing Future Energy Research

After completing his undergraduate studies at ITS, Jaka pursued his master's and doctoral degrees at the University of Queensland, Australia. This academic journey further strengthened his interest in energy technology, particularly research related to energy storage, advanced materials, and processes that support the development of sustainable technologies.

His research experience continued to develop through a postdoctoral program at Deakin University in Melbourne, where he spent more than two years. During this period, he was involved in the development of batteries using special electrolytes based on ionic liquids. This research enriched his understanding of battery technology and electrochemical materials, a field that has become increasingly important in the global energy transition.

His academic journey then continued at the University of Waterloo, Canada, where he was involved in research on the development of high-temperature lithium batteries. This cross-country experience not only deepened his expertise in energy-related fields, but also expanded his academic network, which later became an important foundation for his research career.

In 2016, Jaka joined Swinburne University of Technology, Sarawak Campus, Malaysia, as a senior lecturer. At that time, the research ecosystem on the campus was still developing and remained largely focused on teaching. His publication record, which had reached around 70 scientific articles with an average productivity of 20 articles per year, along with his research collaborations with supervisors in Australia and China, became key considerations that led to his appointment.



The academic career of the lecturer, who has recorded a total of 9,220 citations and an h-index of 46, continued to progress rapidly. In 2018, he was promoted to associate professor and later attained the rank of professor in 2022. He was also entrusted to lead the Research Centre for Sustainable Technologies, a research center focused on sustainable technologies, future energy, and innovations relevant to regional needs.

Impactful Research for Indonesia

In his research, Jaka pays considerable attention to energy issues that are relevant to Indonesia and Malaysia. One of these areas is biorefinery, which involves processing biomass waste into value-added products. Palm oil waste, such as empty fruit bunches, palm fronds, and other residues, can be processed into activated carbon, pyrolysis oil, or alternative fuels.

This research direction is closely related to the regional context, which has strong ties to the palm oil industry. Processes such as pyrolysis and gasification play an important role in converting waste into valuable energy products and materials.

Therefore, in the early stages of my research, the main focus was directed toward biorefinery

– Jaka

In addition to biorefinery, hydrogen energy has also emerged as a key research focus for Jaka at Swinburne Sarawak. This development is supported by the abundance of hydropower in Sarawak, which serves as a primary energy source for hydrogen production. For him, this research direction demonstrates the significant potential of Southeast Asia in supporting the transition toward clean energy.

Although he has built his career abroad, Jaka remains connected to Indonesia's research ecosystem through collaborations with national researchers and research institutions, including the National Research and Innovation Agency (Badan Riset dan Inovasi Nasional or BRIN). "I cannot be separated from Indonesia's research ecosystem. The university where I work still depends on BRIN's facilities," said the faculty member at the Faculty of Engineering, Computing, and Science.

As a recipient of the Top 2% Scientists recognition in the category of Enabling and Strategic Technologies – Chemical Engineering – Energy, based on the 2020 publication by Ioannidis et al. in Public Library of Science (PLOS) Biology, Jaka emphasized that impactful research should not end with scientific publications alone. Technologies must continue to be developed through testing, industrial collaboration, and implementation readiness in order to deliver tangible benefits to society.

With this spirit, Jaka's journey serves as a reminder that ITS alumni are capable of carrying the university's values onto a broader global stage. From his academic foundation in Surabaya to his transnational research network, his work continues to contribute to the future of sustainable energy. **(zan)**



ITS became the early foundation that shaped my interest in research and encouraged him to continue advancing in the field of sustainable energy.

– Jaka

The Spirit of "Gelem Soro", Herryan Syahputra's Journey from ITS to the Mining Industry



This Article Supports SDG 4 and SDG 8
Quality Education; Decent Work and Economic Growth



Herryan Syahputra ST MT is an alumnus of the Department of Materials and Metallurgical Engineering at Institut Teknologi Sepuluh Nopember (ITS). He currently serves as President Director of PT Tambang Meranti Mulia Sejahtera (TMMS). His journey from ITS to the leadership of a mining contractor company reflects how a strong academic foundation, resilience, and alumni networks can open pathways for broader contributions to the industrial sector.

An ITS Foundation for the Industrial World

After completing his undergraduate degree at ITS, Herryan pursued a master's degree in Mechanical Engineering at Swiss German University through a scholarship from United Tractors Group. His professional career began in 2012 as a management trainee at PT Komatsu Remanufacturing Asia. This role allowed him to directly apply the materials and metallurgical engineering knowledge he had acquired during his studies, particularly in the field of remanufacturing.

This experience became even more significant when Herryan joined PT Universal Tekno Reksajaya in 2016. At the time, the company had not yet established an engineering department, and he was entrusted with building it from the ground up. Through this process, he not only strengthened his technical expertise, but also learned to manage teams, develop work systems, and understand business development in a more comprehensive manner.

For Herryan, the education he pursued at ITS was not limited to academic knowledge. The university also shaped his systematic way of thinking, adaptability, and resilience. His ability to understand material characteristics, engineering processes, and industrial needs became an important fundamental that supported his journey across various fields, from manufacturing and engineering to mining.



Building a One-Stop Mining Service

Herryan's career later led him to a new opportunity in mining contractor services. Together with a fellow ITS alumnus from Naval Architecture and Shipbuilding Engineering, he began discussing the idea of establishing a company capable of addressing the needs of the mining industry in a more integrated manner. In 2022, Herryan joined PT TMMS and took part in developing the company from its early stages.

According to Herryan, building a company from the ground up is far from easy. Unlike working in an established company with existing systems, developing a new business requires the courage to design processes, build teams, and make decisions amid uncertainty. Nevertheless, his industrial experience and educational background became essential assets that helped him persevere. "Once you enter the business world, if you cannot swim yet, you have to learn to swim immediately," he said.

Today, PT TMMS has grown into a mining contractor company focused on nickel, with projects located in several areas across Sulawesi. The company also serves clients from South Korea, Switzerland, and China. As it continues to expand, PT TMMS has diversified into commodity trading, including coal, andesite, limestone, and nickel, while also managing upstream-to-downstream operations. "Our vision is to become a one-stop service solution provider in the mining services sector," Herryan explained.



Writing Dreams and Strengthening Alumni Networks

Throughout his life, Herryan has held firmly to a simple principle he developed during his time at ITS: *every dream must be written down*. As a student, he was accustomed to setting targets each semester, ranging from academic achievements and graduation timelines to securing employment before graduation. Through this clear planning, he completed his undergraduate studies in 3.5 years and continues to carry this habit with him today.

Beyond academics, Herryan believes that organizational experience and networks developed during university life play an equally important role. He did not only learn in classrooms, but also built relationships, developed communication skills, and learned to work with people from different backgrounds. These experiences became valuable preparation for his professional journey, particularly in leading teams, establishing partnerships, and making decisions in a dynamic working environment. One of the outcomes of this network was his encounter with a fellow ITS alumnus who later became part of his business journey.



Herryan Syahputra ST MT

President Director of PT Tambang Meranti Mulia Sejahtera (TMMS); Alumnus of the ITS Department of Materials and Metallurgical Engineering

One of the most memorable characteristics of ITS for Herryan is “*gelem soro*”, a Javanese expression meaning the willingness to work hard and endure difficulties. In his point of view, ITS graduates are known for their perseverance, humility in starting from the bottom, and ability to adapt to various working environments. As a Chair of the ITS Materials and Metallurgical Engineering Alumni Association (Ikatan Alumni Material or IKAMAT), Herryan continues to encourage stronger alumni networks to ensure that the relationship between the university and industry remains closely aligned.

Herryan's journey demonstrates that ITS values are not confined to the classroom. They continue to grow through professional life, alumni networks, and the courage to build a business. Through the foundation of materials and metallurgical engineering, the spirit of “*gelem soro*”, and the habit of writing down his dreams since his student years, he proves that ITS graduates are capable of creating opportunities and making meaningful contributions to national industry. **(zan)**

Every dream must be written down. Targets serve as reminders for us to make extraordinary efforts to achieve them.

– Herryan

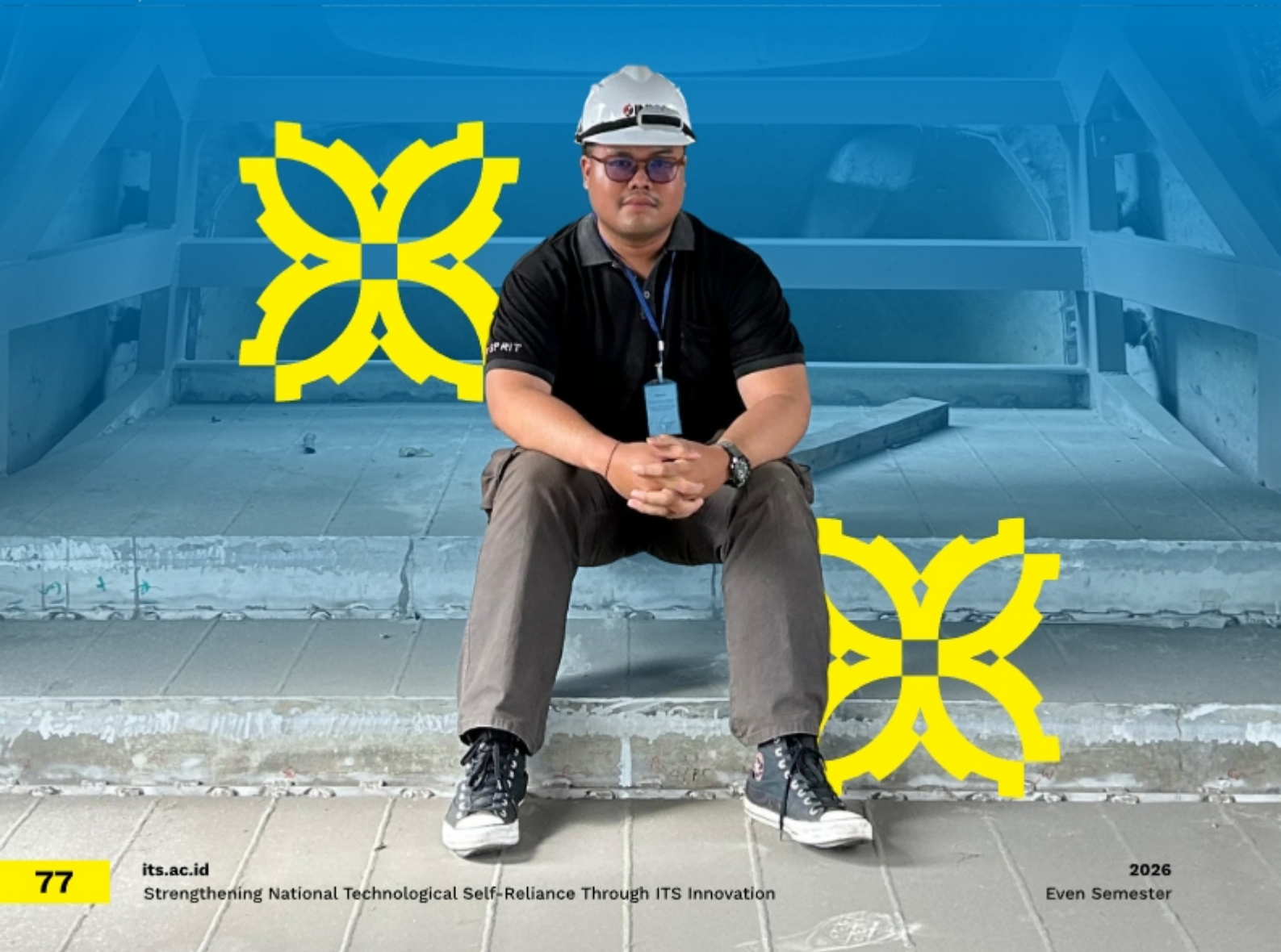
Sketching the Future of Indonesian Transportation Through Design

This Article Supports SDG 4 and SDG 8
Quality education; Decent Work and Economic Growth



Among the many disciplines within the field of design, I Putu Dewangga Bayu Mahesa SDs has chosen to focus his attention on transportation design. For him, design is not merely a matter of aesthetic form, but a tangible bridge for addressing the diverse needs of human life.

The young designer, familiarly known as Angga, is currently building his career as a Research Assistant at the ITS Science Techno Park (STP) Creative Center. There, he explores product design research in depth, with a primary focus on the transportation sector. One of the works that has shaped Angga's perspective is the Batara Airport Express, a futuristic airport train concept designed to support access to the Nusantara Capital City (Ibu Kota Negara Nusantara or IKN).



A Journey in Product Design

The interest of this alumnus of the ITS Department of Industrial Product Design (Desain Produk Industri or Despro) in transportation began with his aspiration to improve people's quality of life. In his view, transportation plays a crucial role because it is directly connected to the rhythm of daily activities. "I see that one aspect closely tied to transportation is design," he said.

Angga's journey in design began when he decided to pursue his studies at Despro ITS. He regarded the department as closely aligned, in technical terms, with the practical needs of industry. This approach resonated with his way of thinking, which emphasizes manufacturing-oriented design that can be produced, implemented, and used. For him, a design becomes more valuable when it is able to bridge creativity with real-world application.

His enthusiasm grew even stronger when he met Dr Agus Windharto DEA, a lecturer with extensive experience in the field of transportation. Under his mentor's thoughtful guidance, Angga's long-standing ideas on railway design finally found the right platform for realization through his final project.

This final project ultimately served as the foundation for the development of the Batara Airport Express airport train design

– Angga



Behind the Batara Airport Express

The Batara Airport Express emerged from Angga's concern over accessibility to the IKN area, which does not yet have a commercial airport. This condition requires visitors to first arrive at Sultan Aji Muhammad Sulaiman, Sepinggan Airport in Balikpapan. "For this reason, fast, comfortable, and context-appropriate mass transportation is needed to support mobility to the IKN," Angga explained.

He revealed that Batara, an abbreviation of Balikpapan-Nusantara, was designed as an icon of future mobility. Angga carefully considered storage space, accessibility, seating comfort, and passenger flow in the design process. "Since the passengers are travelers carrying suitcases, an efficient journey is essential," he noted.



From a visual perspective, Angga explained that the Batara Airport Express draws inspiration from the morphology of the dragonfly. The insect was intentionally chosen because it is often associated with pure environments and symbolizes good fortune in various cultures. The silhouette of the dragonfly's head is elegantly translated into the train's nose, complemented by blue and green tones that evoke a natural yet modern impression in harmony with the spirit of the IKN.

Beyond its visual aspects, the Batara Airport Express also demonstrates operational innovation. The front section of the train is designed with a flat structure that functions as a connecting door between trainsets. Through this concept, two trainsets can be joined more easily during periods of increased passenger demand.

This innovation was developed without restricting passengers' freedom of movement between carriages

– Angga

This work later received an award at the 5th Indonesia Industrial Design Student Award (IIDSAs) in 2024 under the Service-Oriented Design Solution category. This achievement serves as evidence that the Batara design is not only conceptually strong, but also considered relevant as a transportation solution. For Angga, the award became an important motivation to continue exploring the field of transportation design.





Meaningful Steps at the ITS Design Center

For Angga, the Batara Airport Express is not merely a final project, but also a pivotal point that shaped his perspective as a designer. He holds firmly to Abraham Lincoln's quote, *The best way to predict the future is to create it*. He interprets this statement as an encouragement for designers not to stop at imagining the future, but to have the courage to bring it to life through concrete work.

The cycling enthusiast applies this perspective in his work at the ITS STP Creative Center. Immersed in an environment that continuously encourages him to learn, Angga realizes that design cannot stand alone. It must continue to move in close connection with research, technology, users, and the industrial ecosystem.



To his fellow students, Angga shares a simple message, *do not be afraid to explore and commit to the field you love*. For him, great design always begins with human empathy, data analysis, and a deep understanding of user needs. "With the support of an environment like ITS, practical design innovations can truly be realized," Angga concluded. **(yer/sal)**

Coupled with a supportive environment like ITS, practical design innovations can truly happen

– Angga

Who Should Impactful Technology Serve?



This Article Supports Numbers of Sustainable Development Goals 

Impactful technology should ultimately serve people, addressing real challenges while strengthening society's capacity to become more resilient and self-reliant. Through research and innovation, the ITS academic community continues to transform knowledge into accessible, relevant, and sustainable solutions for communities, industries, and government. By placing human needs at the heart of technological advancement, ITS seeks to ensure that every innovation contributes not only to scientific progress, but also to a more inclusive future and stronger national technological self-reliance.

1 **Adelia Rizky Ramadhani**

Student of the Department of Biomedical Engineering

Impactful technology should reach the wider community, especially the groups that need it most and have so far been least touched by progress. The highest measure of innovation isn't how advanced its specifications are, but how effectively it can solve humanity's fundamental problems. Technology shouldn't be reserved for the elite or end up merely as a prototype on display in a campus laboratory. The success of research and innovation is measured by how well complex scientific formulas and technical systems are translated into practical, affordable tools that are easy for grassroots communities to use.

2 **Fauzan Fakhrizal Azmi**

Staff of the Unit of Public Communications

Impactful technology should be born out of real problems and stay as close as possible to people's everyday lives. It shouldn't just be sophisticated in the lab — it needs to be accessible, affordable, relevant, and genuinely helpful, from making work easier and opening up opportunities to improving quality of life. After all, the success of technology isn't measured by how advanced the innovation is, but by how much benefit society actually feels from it.

3 **Putri Pratama Ohorella**

Staff of the Unit of Public Communications

Impactful technology should be available to everyone, but especially to those who need solutions the most. It's not just about how sophisticated the technology is, but how much of its benefit can be felt by the wider community. Good technology doesn't create distance — it opens up access, makes life easier, and offers more equal opportunities for many people.

4

Khoirun Nisa

Student of the Department of Engineering Physics

The success of a technology shouldn't be measured only by how advanced it is, but by how well it meets society's needs. With that in mind, universities have a responsibility to develop their research and innovations further, so they don't stop at being merely academic outputs, but become implementable solutions that benefit society, industry, and government alike.

5

Husni Mubarak

Student of the Department of Industrial Chemical Engineering

In my opinion, truly impactful technology should be available to the whole of society and able to meet real needs. However, what matters more isn't creating the most sophisticated or innovative technology, but ensuring that it can actually be applied and used. Today, a great deal of research produces remarkable innovations, yet only a small portion ever reaches the implementation stage. That's why our focus shouldn't just be on creating the best technology, but also on how it can be applied, easily adopted, and made to deliver real benefits for society.

6

Raiyan Adi

Staff of the Secretary of the Institute

Impactful technology is technology that provides easier access for vulnerable groups, aiming to offer equal access opportunities. It doesn't need to receive special attention or treatment — rather, it should demonstrate that the innovation genuinely meets people's needs. Impactful technology can also be understood as reciprocal in nature: as people continue to create (in design, function, values, and norms) and carry out innovative research, the results of that creation, in turn, shape people as well (in behavior, thinking, and habits).

7

Muhammad Hanif

Student of the Department of Mechanical Engineering; CEO & Founder of Terangin

Impactful technology is a technology that doesn't just stop at a paper or a prototype, but can actually be purchased by the public. A great deal of research comes to a halt simply because funding runs out — even though funds had already been allocated, they ultimately go to waste. That's why impactful technology should be the technology that benefits society and also creates jobs for many people through its production process.

8

Eivellya Nur Izzati

Alumni of the Department of Industrial and Systems Engineering

Impactful technology should be built for people who genuinely need solutions, not just to look good in a presentation. Ultimately, technology should make life easier, work faster, and everyday problems simpler to solve — because the best technology is the kind that makes people say, "Wow, this is actually useful!"

9 **Mohammad Febryan Khamim**
Alumni of the Department of Mathematics

In my opinion, technology should have an impact on the wider community. An innovation should focus on how much impact it delivers to its users, rather than how sophisticated the tool itself is. That's why society needs to be one of the actors involved in technology development. From what I've observed, many current innovations are still focused on the sophistication of the tool rather than its impact on society. Therefore, to further increase the benefits of technology for society, synergy is needed among various parties — the public as users, academics as researchers, and the government as a key stakeholder. Through strong collaboration among all these parties, the benefits of technology won't stop at research alone, but will also be enjoyed by the wider community.

10 **Icha**
Staff of the Unit of SDGs and Smart Eco Campus

Impactful technology should be available to everyone, inclusively. To achieve that, it needs to be efficient and affordable, and, most importantly, it must avoid causing negative economic, social, or environmental impacts while helping its users.

11 **Ika Cahya Nurani**
Student of the Department of Chemical Engineering

In my opinion, impactful technology should provide real solutions to the everyday lives of the wider community. An innovation shouldn't just be a rigid, complicated concept — it needs to be designed in a more approachable way so ordinary people can easily understand it. Ultimately, product development should result in genuine solutions that address the concerns of students, the academic community, and the public at large, rather than remaining just an idea on paper.

12 **Hilmy Alfadel Nurindaputra**
Student of the Department of Industrial Mechanical Engineering

In my opinion, impactful technology should reach every layer of society, particularly in addressing real challenges in education, energy, health, and the environment. The success of an innovation isn't measured only by how advanced the technology is, but by how much added value it creates, how far it drives sustainable development, and how much it improves people's quality of life. As a student, I believe research should be impact-driven, supported by pentahelix collaboration, and able to push the downstream application of research results — so that knowledge doesn't stop at publication, but becomes an adaptive, inclusive solution that delivers real benefits to society, industry, and government.

13 **Ishmatu Aulia Rizky Kirana**
Student of the Department of Instrumentation Engineering

Technology shouldn't only be created to keep up with the times, but also to solve real problems. Its impact will be felt more strongly when the resulting innovation can be widely used by society, businesses, and government alike.

- 14 Hana Yosinta Maria**
Staff of the Secretary of the Institute

Technology that has a real influence on the problems experienced by the wider community across every aspect — economy, health (physical and mental), environment, culture, and politics. It should have a genuine, tangible effect and drive positive change wherever it is applied, creating new habits or new challenges that are ultimately positive.

- 15 Anissa Bellafitria**
Staff of the Technical Implementation Unit of Retail Services

Every layer of society, without exception — including communities in remote, underdeveloped, and border (Tertinggal, Terdepan, and Terluar or 3T) areas.

- 16 Maria Alexandra Stefanny**
Other – SMAK Frateran Surabaya

In my opinion, impactful technology should be available to everyone, especially those in society who need solutions in their daily lives the most. Technology shouldn't only benefit certain groups — it should also be accessible to students, workers, small business owners, and communities with limited access. That way, innovation can genuinely deliver real benefits, improve quality of life, and help solve the various problems society faces.

- 17 Naurah Alifiya Safa'a**
Staff of the Unit of Independent Business Management

Impactful technology needs to become a supporting medium for people from all kinds of backgrounds, and it should reach every layer of society regardless of class. In today's modern era, technology is essential for daily life — whether in academics, household matters, or work.

The best technology is not the most sophisticated, but the one that stays closest to human needs and delivers the most tangible benefits to everyday life.

These diverse perspectives demonstrate that impactful technology must go beyond laboratories, publications, and prototypes. Innovation should emerge from real-world challenges, be developed alongside its users, and be transformed into solutions that are accessible, affordable, inclusive, and sustainable. Through collaboration among universities, communities, industries, and government, technology can become more than a symbol of progress—it can open opportunities, improve quality of life, and create meaningful change for those who need it most.



Growing with ITS Innovation

Feby Sherlita Dinata

The Batch 2024 Student of the ITS Department
of Visual Communication Design



ITS Unit of Public Communication

The Unit of Public Communication of Institut Teknologi Sepuluh Nopember (ITS) continues to serve as the frontline in supporting, creating, and expanding various strategic programs within ITS. From technological research and innovation to community engagement and student achievements, the unit serves as a driving force in ensuring that every major narrative of the Campus of Heroes is heard, recognized, and able to generate broader impact.

The Unit of Public Communication develops strategic communication initiatives to support the realization of ITS's vision and missions through several key programs:

- **Creative Communication Digitalization:** Optimizing social media and digital platforms through interactive content that remains relevant to emerging trends.
- **Strengthening Media Synergy:** Expanding strategic partnerships with national and international media to amplify the impact of ITS research, innovation, and institutional achievements.
- **Integrated Reputation Management:** Establishing a strong institutional brand positioning as one of Indonesia's leading universities in research and innovation.

Through a renewed approach to institutional communication that remains responsive to the evolving dynamics of society, the communication strategy of Unit of Public Communication is prepared to support every progressive step of the institute toward the future. Together, let us build strong synergy, advance national innovation, and create a publicity impact without boundaries.



**A New Face of ITS Unit of Public Communication:
Amplifying Achievements on the Global Stage**



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